FOURTEENTH ANNUAL REPORT

OF THE

OREGON AGRICULTURAL COLLEGE

AND

EXPERIMENT STATION

FOR THE YEAR ENDING

JUNE 30, 1902.

AGRICULTURAL COLLEGE PRINTING OFFICE.
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FOURTEENTH ANNUAL REPORT

OF THE

OREGON AGRICULTURAL COLLEGE AND EXPERIMENT STATION.

REPORT OF THE PRESIDENT OF THE BOARD OF REGENTS.

To His Excellency, T. T. Geer, Governor of Oregon:

SIR:—I have the honor to submit a report of the work done at the State Agricultural College and Experiment Station, for the year ending June 30th, 1902, and a synopsis of the condition of the College and its properties.

FINANCIAL STATEMENT.

BALANCES ON HAND JULY 1, 1901.

State Interest	$ 46.33	
Improvement	33.33	
Chemical Breakage	664.72	
Local Station	796.12	
Special	1,216.11	$2,756.61

INCOME FOR THE YEAR.

Station—Hatch	$15,000.00	
College—Morrill	25,000.00	
State Interest	10,362.85	
Improvement	537.72	
Chemical Breakage	711.00	
Local Station	1,177.61	
Special	31,020.94	$83,810.12
Total available funds		$86,566.73

DISBURSEMENTS.

Station	$15,000.00	
College	25,000.00	
State Interest	10,409.18	
Improvement	559.44	
Chemical Breakage	1,197.07	
Local Station	1,972.08	
Special	32,237.05	$86,374.82
Balance		$ 191.91

BALANCES BY FUNDS.

Improvement	$ 11.81	
Chemical Breakage	178.65	
Local Station	1.65	$ 191.91

TREASURER'S ACCOUNT—FACE OF LEDGER.

Fund.	Dr.	Cr.	Balances.
Station	$15,000.00	$15,000.00	
College	25,000.00	25,000.00	
State Interest	10,409.18	10,409.18	
Improvement	571.05	559.44	$ 11.61
Chemical Breakage	1,375.72	1,197.07	178.65
Local Station	1,973.73	1,972.08	1.65
Special	32,237.05	32,237.05	
Totals	$86,566.73	$86,374.82	$191.91

The Treasurer's itemized report of the receipts and expenditures of the various funds of the College and Experiment Station is submitted herewith and made a part of this report.

Submitted herewith is a copy of the report of the President of the College and the Director of the Station, which will give the detailed work of the College and Station during the past year.

PROPERTIES BELONGING TO THE COLLEGE.

The College is the owner of 184.32 acres of land situated immediately west of the City of Corvallis, Benton County, Oregon, and of the estimated value of $25,000.00 without improvements. About 40 acres of this land is used for the various College buildings, campus, parade grounds, and lawns. It is laid out in walks and drives and adorned with trees, shrubbery and flowers. The remainder is used for experimental purposes in agriculture and horticulture, and is laid out in small plats for the various kinds of grasses, grains, vegetables, and productions generally of the farm.

BUILDINGS.

The Administration Building was erected by the citizens of Benton County, and with 39½ acres of ground donated to the State of Oregon, as an inducement to the people of the State to permanently locate the State Agricultural College at Corvallis. It is a three story brick building containing fourteen rooms suitably arranged and well adapted for school purposes. It is of the estimated value of $25,000.00. It is situated on a small hill in a commanding position and is a beautiful, substantial and imposing building.

The Agricultural Hall is nearing completion and will be finished and ready for occupancy by the opening of the school year of 1902. It is a three-story Oregon gray granite and sandstone building 85x125 feet and is situated about 150 yards southeast of the Adminis-

tration Building. It is intended for an assembly hall for the Agricultural and Horticultural classes, laboratories and class rooms and for all purposes connected with agriculture and chemistry and the Experiment Station. When completed it will cost about $42,000.00. This is probably the best building on the ground.

Mechanical Hall is located on the northeast and about 150 yards distant from the Administration Building. It is constructed of Oregon gray granite and sandstone. It is two stories high, 90x100 feet. It is a fine substantial building, well arranged and admirably adapted for the purpose for which it is used. It is valued at $23,000.00.

The Armory is situated south of the Administration Building some 200 yards. This is a large two story wooden structure 70x120 feet. It is used for public gatherings, for armory purposes, gymnasiums, etc. It is valued at $10,000.00.

Cauthorn Hall is a two-story wooden structure intended for a home for young men attending the College and will accommodate 100 persons. It is valued at $15,000.00.

Alpha Hall is a frame two-story building, designed as a home for young ladies attending College and will accommodate 40 persons. It is valued at $4,000.00.

Horticultural Building stands north of the Administration Building about 200 yards, and is used as class rooms and has laboratories and green houses connected therewith. It is, including laboratories, valued at $2,500.00. This building is now inadequate to the needs of this department and should, in the near future, be replaced by a larger one.

The Chemistry Building is situated just south of the Administration Building and is a medium sized frame building and of the value of $4,000.00.

West of the Administration Building and about 200 yards distant, is located the power house and blacksmith shop, a one story brick structure, large and roomy, valued at $6,000.00.

North of the Administration Building is situated the heating plant. The building is of brick and the plant consists of two boilers each of 75 horse power, of superior make and quality. From this plant all the buildings on the ground are heated, by means of pipes conducting the heat underground to the various buildings. The buildings and machinery and heating apparatus are valued at $26,000.00.

The water supply is obtained from wells immediately west of the Administration Building by means of pumps operated by steam engines stationed in the power house. The machinery and buildings connected therewith are of the value of $2,000.00. The supply is scarcely adequate to the present demands. If the attendance of the College grows in numbers in like proportion in the future, that it has in the past few years, it will be entirely inadequate.

LIGHTS.

Electricity is generated at the power house by steam power and is conducted to all of the buildings belonging to the College. The complete plant is of the probable value of $3,000.00.

Mechanical Hall is supplied with a sufficient amount of the latest improved machinery to teach mechanism in its various branches most successfully, and is valued at $12,000.00.

CREAMERY.

The Creamery Building is situated some distance west of the Administration Building, and is a complete model creamery where instructions are given in all that pertains to this great industry. It is of the value of about $500.00. However, as soon as Agricultural Hall is completed it will be transferred to that building.

The farm has also good barns, a number of silos, the usual farm machinery and is of the value of $2,500.00.

MACHINERY, APPARATUS AND APPLIANCES.

Blacksmith tools, $500.00; Chemical department, $3,000.00; Agricultural department, $1,500.00; Printing office, $2,500.00; Machinery Power House, $1,000.00; Photo and Bacteriology, $1,000.00; Live stock, $1,500.00; Library, 3270 volumes, valued at $3,270.00.

That the properties belonging to the College and under the care and charge of the Board of Regents at Corvallis, is valued at $167,270.00.

The Legislature of the State of Oregon, in 1901 authorized a substation to be located at Union in Union County, Oregon, on a tract of land belonging to the State of Oregon, and appropriated for that purpose the sum of $10,000.00. The Board of Regents took immediate charge of the property and entered upon the task of establishing an experimental station at the point designated. They found the land, however, much neglected and in poor condition for that purpose, requiring quite a large expenditure of

money to repair buildings, and to build new ones; to repair fences, to dig ditches and otherwise put the grounds in a condition suitable for experimental purposes. I am pleased, however, to report that under the management of Prof. A. B. Leckenby, order is being brought out of chaos. He has done much work and made valuable improvements. He has about forty varieties of grasses and as many varieties of sugar beets with which he is experimenting, endeavoring to secure something suitable for the regions of eastern Oregon. This farm which comprises 640 acres, is much larger than the needs of the station require at the present time. The Board of Regents leased about 200 acres to the Sugar Beet Company for the propagation of sugar beets, for which they are to pay rent at the rate of $3.00 per acre per annum. This lease is made for the period of three years. All money derived from this source will be used for the improvement of the Station grounds and to pay expenses incurred at the Station. We feel confident that this Station will be of great value to the State of Oregon, especially to that large portion of it lying east of the Cascade Mountains. It will be necessary however, to enable us to properly carry on this work to have more funds to put the Station in the condition in which it should be placed. It will be necessary to construct new fences, build barns and other buildings, to purchase more tools and machinery, to pay for labor and to purchase laboratory and equipments, dairy and dairy outfit, and such number of hogs, sheep and cattle that may be necessary to carry on experiments and to conduct the work of the Station properly, and should have an appropriation of at least $20,000.00.

Of the $10,000.00 appropriated for the purpose of establishing said Station at Union, there has been expended $7,516.00. There is now on hand $2,480, with which to pay the current expenses of the farm for the remainder of the year. The current expenses amount to from $200 to $300 per month. Out of the money expended we have erected a two story brick building, purchased a span of good horses, a new wagon, plows, cultivators, mowers and other farm implements, painted and repaired the dwelling house, repaired the barn and completed a system of ditches for the purpose of draining the grounds.

The year just closed has probably been the most successful in the history of the College. The number in attendance has been

larger than in any former year. The total number enrolled is 488, coming from all walks of life and from every portion of the State. They are a fine lot of young people who are earnestly seeking a practical education, such an education as will be of inestimable value to the State of Oregon as well as to themselves. Their deportment has been all that could be asked or expected. There was graduated from the College, on Wednesday, June 17th, 1902, 36 persons.

The management of the College has been quite satisfactory during the past year. The President and his able corps of Professors have been very enthusiastic, earnest and industrious in their work, all striving to advance the best interests of the College.

The State Agricultural College has ceased to be an experiment and has become one of the most potent agencies in the advancement of the material interests of the State. What it has done is but a moiety of the good it can and will do in the future. It disseminates useful and practical knowledge to the vast army of agricultural and mechanical laborers who make the wealth and secure the stability of the nation.

Respectfully submitted,

J. K. WEATHERFORD,

President of the Board of Regents.

TREASURER'S REPORT.

CORVALLIS, OREGON, July 16, 1902.

To the Honorable the Board of Regents, Oregon Agricultural College:—

GENTLEMEN:—Herewith I submit my report for the year ending June 30, 1902. The vouchers and other evidences of payment are on file in the office of the Clerk and Purchasing Agent.

Very respectfully,

B. F. IRVINE, Treasurer.

BALANCE ON HAND JULY 1, 1901.

State Interest	$ 46.33	
Improvement	33.33	
Chemical Breakage	664.72	
Local Station	796.12	
Special	1,216.11	$ 2,756.61

INCOME FOR THE YEAR.

Station—Hatch	$15,000.00	
College—Morrill	25,000.00	
State Interest	10,362.85	
Improvement	537.72	
Chemical Breakage	711.00	
Local Station	1,177.61	
Special	31,020.94	$83,810.12
Total available funds		$86,566.73

DISBURSEMENTS.

Station	$15,000.00	
College	25,000.00	
State Interest	10,409.18	
Improvement	559.44	
Chemical Breakage	1,197.07	
Local Station	1,972.08	
Special	32,237.05	$86,374.82
Balance		$ 191.91

BALANCES BY FUNDS.

Improvement	$ 11.61	
Chemical Breakage	178.65	
Local Station	1.65	$ 191.91

MISCELLANEOUS RECEIPTS AND THEIR DISTRIBUTION.

Source.	Amount.	Local Station.	Improvement.
Agriculture	$ 509.89	$ 494.39	$ 15.50
Dairy	523.26	506.57	16.69
Horticulture	8 37	.....	8.37
Miscellaneous	523.81	26.65	497.16
United States	150.00	150.00	.....
Totals	$1,715.33	$1,177.61	$ 537.72

DISBURSEMENTS BY SALARIES, INCIDENTALS, TOTALS.

DEPARTMENT OR ITEM.	SALARIES.	INCIDENTALS.	TOTALS.
Printing	$ 1,600.00	$ 807.34	$ 2,407 34
Agriculture	3,080.00	2,706.97	5,786.97
Horticulture	1,080.00	2,200.72	3,280.72
Botany	1,600.00	202.27	1,802.27
Chemistry	4,724 00	809.92	5,533.92
Chemical Breakage		1,197.07	1,197.07
Bacteriology	1,320.00	14.06	1,334.06
Entomology	2,432 55	63.08	2,495.63
Mechanics	4,220.00	906.22	5,126.22
Household Economy	1,560.00	34.70	1,594.70
Military	120.00	162.25	282.25
Library	380.00	822.33	1,202.33
Drawing	725.00	1.84	721.84
Salaries outside departments	17,815.00		17,815.00
Sanitary		233.00	233.00
Furniture		486.55	486.55
Traveling expenses		764.01	764.01
Advertising		287.37	287.37
Fuel		1,555.05	1,555.05
Insurance		932.95	932.95
Postage		298.43	298.43
Freight		425.24	425.24
Telephones and telegrams		122.02	122.02
Scientific apparatus		325.91	325.91
Tools and machinery		737.14	737.14
Building repairs—general		282.85	282.85
Miscellaneous labor		591.05	591.05
Miscellaneous supplies		211.64	211.64
Miscellaneous salaries		20.00	20.00
Cauthorn Hall		288.15	288.15
Alpha Hall		56.75	56.75
Miscellaneous and current		1,308.26	1,308.26
Gymnasium		232.42	232.42
Building, Station, new		602.15	602.15
Repairs—Painting		1,097.50	1,097.50
Repairs—Heating		4,070.00	4,070.00
Repairs—Plumbing		2,048.00	2,048.00
Architect's Fees		360.00	360.00
Live Stock		538.06	538.06
Agricultural Hall—New		17,920.00	17,920.00
Totals	$40,651.55	$45,723.27	$86,374.82

TREASURER'S ACCOUNT—FACE OF LEDGER.

FUND.	DR.	CR.	BALANCES.
Station	$15,000.00	$15,000.00	$ ----- ----
College	25,000.00	25,000.00	----- ----
State Interest	10,409.18	10,409.18	----- ----
Improvement	571.05	559.44	11.61
Chemical Breakage	1,375.72	1,197.07	178.65
Local Station	1,973.73	1,972.08	1.65
Special	32,237.05	32,237.05	----- ----
Totals	$86,566.73	$86,374.82	$ 191.91

REPORT OF THE FINANCE COMMITTEE.

CORVALLIS, OREGON, July 16, 1902.

To the Board of Regents:—

GENTLEMEN:—We your Finance Committee would respectfully report that we have examined the books and vouchers in the office of the Clerk and Purchasing Agent of the College and Station and we find the same well kept, neat, and correct.

We have checked up all the drafts and compared them with the original receipted bills on file and we have found them correct as set forth in the reports and books of the Clerk.

We have examined the report of the Treasurer of the Board for the year ending June 30, 1902, and find it correct as to the amount of money to be accounted for, and the receipts and disbursements are found to be correct and agree with the books and vouchers on file in the office of the College and Station.

We find that the expenditures for the College and Station for the year have, in the aggregate, exceeded the amount that will be available to carry on the work for the ensuing year. It will be necessary, therefore, to practice economy so that we may be able to meet the expenses of the coming year.

Respectfully submitted,

J. T. APPERSON,
B. G. LEEDY,
W. E. YATES,
Finance Committee.

FINANCIAL ACCOUNT.

Oregon Agricultural Experiment Station, in account with the United States Appropriation, 1901–1902.

DR.

To receipts from the Treasurer of the United States as per appropriation for fiscal year ending June 30, 1902, as per act of Congress approved March 2, 1887	$15,000.00

CR

By Salaries	$10,463.50	
Labor	2,114.52	
Publications	469.85	
Postage and stationery	71.23	
Freight and express	131.75	
Heat, light, water, and power		
Chemical supplies	247.86	
Seeds, plants, and sundry supplies	133.59	
Fertilizers	15 13	
Feeding stuffs	423.00	
Library	70.46	
Tools, implements, and machinery	139.54	
Furniture and fixtures		
Scientific apparatus	98.12	
Live stock		
Traveling expenses		
Contingent expenses	19.30	
Buildings and repairs	602.15	
		$15,000.00

We, the undersigned, duly appointed Auditors of the Corporation, do hereby certify that we have examined the books and accounts of the Oregon Agricultural Experiment Station for the fiscal year ended June 30, 1902; that we have found the same well kept and classified as above, and that the receipts for the year from the Treasurer of the United States are shown to have been $15,000.00, and the corresponding disbursements $15,000.00; for all of which proper vouchers are on file and have been by us examined and found correct.

And we further certify that the expenditures have been solely for the purposes set forth in the act of Congress approved March 2, 1887. Signed:

J. T. APPERSON,
B. G. LEEDY,
W. E. YATES,
} Auditors.

SUPPLEMENTARY REPORT.

LOCAL STATION FUND.

Balance on hand July 1, 1901	$ 796.12	
Received from sales of farm products, etc.	1,177.61	
		$ 1,973.73

DISBURSEMENTS.

Labor	$ 480.00	
Freight and express	23.85	
Seeds, plants, and sundry supplies	58.47	
Live stock	538.06	
Traveling expenses	433.31	
Contingent expenses	438.39	
		$ 1,972.08
Balance		$ 1.65

REPORT OF THE PRESIDENT.

To the Honorable Board of Regents of the Oregon Agricultural College:—

GENTLEMEN:—Herewith I submit my report for the Collegiate year ending June 18, 1902.

ENROLLMENT.

There were 488 students in attendance the past year. Of this number 321 were men and 167, or about one-third the whole, were women. The Freshman class was unusually large, numbering 247. For the past three years the annual increase in attendance has been over 12 per cent. As we have not advertised for several months we can hardly expect the usual increase next year.

On examining the registration cards for the past year we find that:

71 per cent of the parents of students are farmers,

10 per cent are mechanics and day laborers,

8 per cent are merchants and capitalists,

11 per cent belong to the professions and other occupations.

It is estimated that about 80 per cent of our students return to the workshop and farm.

DRILL GROUNDS.

I would call the attention of the Board to the fact that we must give up the plan of improving and beautifying our grounds or we must procure grounds elsewhere for drill and athletic purposes. I have been informed that a six acre tract near the Armory can be obtained for a term of years at a low rental. If this ground were enclosed by a high fence it would be an admirable place for drill and out-door athletics. As we are situated at least one-fourth of those who attend and enjoy out-door sports contribute nothing to their support. Nearly all our progressive institutions have athletic fields properly enclosed.

INCIDENTAL FEE.

I would respectfully suggest that a small incidental fee, say $1.00, be collected each term from every student. It is safe to say that in no other college in America are the necessary expenses of students as low as in ours. But may we not carry this principle too far? We have free tuition, free library, free magazines, free printing, free diplomas, free commencements—every thing free. People very generally have a higher appreciation of privileges for which they in some way render a return. Besides, many little ex-

penses not recognized by the laws controlling our funds, must be incurred during the year. It is only by voluntary contributions from students, members of the Faculty and friends of the College that these can be met. It thus often happens that the burden falls on those who are liberally inclined while those more able to pay enjoy the results gratis. This is especially true in the case of athletics. At the beginning of the year students freely vote to tax themselves and a majority, to their honor be it said, cheerfully pay their moieties but many neglect to pay because the tax is not recognized by the authorities. Such expenses could be equalized by a small incidental fee. Within a year the tract mentioned could be fenced and other justifiable expenses could be paid without infringing on the laws governing the funds received from the state and the nation.

THE HALLS.

I take pleasure in stating that the Halls are in a healthful and flourishing condition. As recitations and registration duties make exacting demands on Prof. Horner's time it is doing Mrs. Horner but sheer justice to say that the success of Cauthorn Hall is due in a great measure to her judicious management.

I am sorry to state that Mrs. Callahan and Miss Chamberlin have severed their connection with Alpha Hall. To the business management of the former and to the care which the latter has exercised over the young ladies we are indebted for the good reputation of this Hall. Nearly all the rooms are engaged for the ensuing year.

It is particularly gratifying to know that the expenses of both Halls have been promptly met and that no stigma attaches to the fair name of our College through unpaid bills at the stores.

There were 88 members enrolled in the Cauthorn Hall Club and the cost of living was $2.43 a week.

There were 32 enrolled in the Alpha Hall Club and the cost per week was $2.50. Out of receipts thus obtained a considerable amount has been invested for additional fixtures in both Halls.

DEPARTMENT OF MUSIC.

The demand for this department has fully justified the recommendations made in my last report. The receipts for lessons amounted to $807.50 and the expenditures, not including the new

piano, amounted to $726.69. A new Chickering piano was purchased for $326.50.

The lady who taught in this department the past year possesses indomitable energy and great organizing ability. A teacher endowed with these high qualities and with a corresponding skill in music could make this department almost self-sustaining.

BUSINESS DEPARTMENT.

There was also a great demand for instruction in this new department. Indeed, many applicants, for want of room, were rejected and placed against their will in other courses. As this was but a two years course some may have entered thinking they had found what in student parlance is called a "snap."

We have increased the course to four years, making it particularly strong in English. We have strengthened the English, too, in the other courses. We believe the English now required in our College will compare favorably with that in the best of our Agricultural Colleges.

THE LIBRARY.

The library being a waiting room for the students many congregate there between recitations. This makes the duties of the librarian very arduous. He must know where every book is, must be ready to wait on every applicant and at the same time must preserve order in the room. Mr. Arthur J. Stimpson having resigned during term-time I appointed Mr. L. W. Oren to serve in his place. Mr. Oren in every respect has been an admirable librarian but having entered the Civil Service his resignation leaves the office vacant.

INSTRUCTOR IN BIOLOGY.

Mr. F. M. McElfresh having resigned the instructorship in Biology Mr. W. T. Shaw, an instructor in the Iowa Agricultural College, was selected for the position. Mr. Shaw is an experienced and accomplished teacher, and his work thus far justifies the increase of salary which the committee had to promise.

MINING LEGISLATION.

While the bill for the endowment and maintenance of mining schools was pending in Congress many dispatches and letters asking our assistance were received from Dr. H. H. Goodell and Dr. G. W. Atherton of the Executive Committee of the Association of

Agricultural Colleges, and from many other friends interested. They thought our College was particularly concerned. Finding correspondence unsatisfactory I requested Dr. Withycombe to go to Washington and act in conjunction with these gentlemen. As he had lately been elected Director of our Station, it was desirable too, that he should confer with the chief directors of the Station work that our work might be made to harmonize with their plans as far as practicable.

His expenses, as per itemized bill accompanying this report, amounted to $193.50. Not feeling authorized, without special permission of the Board, to draw on the College for these expenses, I paid them myself.

REPORTS.

A blank filled out each term by every instructor, gives among other items the number of students enrolled in each of his classes, the number of hours devoted to each class and the whole number of hours devoted to recitations and lectures. Accompanying you will find these reports arranged in alphabetical order. There is, however, a great deal of labor performed in field and laboratory that cannot be thus tabulated. Sketches of such work in several departments are hereto appended.

Respectfully,

THOS. M. GATCH,

President.

STATE AGRICULTURAL COLLEGE OF OREGON,

CORVALLIS, Oregon, June 30, 1902.

Report of the President of said institution to the Secretary of the Interior and the Secretary of Agriculture, as required by act of Congress of August 30, 1890, in aid of Colleges of Agriculture and Mechanic Arts.

I. Condition and Progress of the Institution for the year ended June 30, 1902, especially—

(1) Changes in course or methods of instruction if of sufficient importance to warrant mention, and (2) purpose, structural character, and cost of new buildings or addition to buildings.

(1). The Business course mentioned in last year's report has been extended to a four years' course and denominated The Literary Commerce Course.

(2). A three story stone building, to be know as the Agricultural Hall, has been nearly completed. It is 125x85 feet, and will be occupied in September, 1902, for the accommodation of the Station staff principally. College classes will also be conducted there. $17,920 has been paid to date and the entire cost will be between $45,000 and $50,000.

II. Value of Additions to Equipment during the year ended June 30, 1902.

(a) Permanent endowment	$
(b) Buildings	18,522.15
(c) Library	822.33
(d) Apparatus	325.91
(e) Machinery	737.14
(f) Miscellaneous	232.42
Total	$20,639.95

III. Farmers' Institutes during the year ended June 30, 1902.

1. Number of institutes held in the State	19
2. Total attendance	3,335
3. Number of institutes attended by college and station staffs	19
4. Number of different members of the staffs engaged in the work	4
5. Amount of time in days given to institute work by college and station staffs	188
6. State appropriation for institutes for year ended June 30, 1902	None

IV. Student Labor during the year ended June 30, 1902.

1. Does your institution employ student labor? Yes.
2. Number of students employed during year. Cannot give.
3. Average amount earned by each student. Cannot give.
4. Total amount expended for student labor. $624.73.
5. Amount of State appropriation for student labor, none

We pay 10 cents an hour during term time and 12½ cents during summer vacation.

V. Receipts for and during the year ended June 30, 1902.

1. State aid.	(a) Income from endowment granted by State	
	(b) Appropriation for current expenses	5,000.00
	(c) Appropriation for building or for other special purposes	25,954.17
2. Federal aid.	(a) Income from land grant, act of July 2, 1862	10,362.85
	(b) Income from other land grants	
	(c) Additional endowment, act of August 30, 1890	25,000.00
	(b) For experiment station, act of March 2, 1887	15,000.00
3. Income from endowment other than Federal or State grants		
4. Fees and all other sources.	(a) Tuition fees	
	(b) Incidental fees	711.00
	(c) Miscellaneous receipts	1,782.10
Total		$83,810.12

VI. Expenditures for and during the year ended June 30, 1902.

1. Instruction (including facilities) in the subjects specified in act of Augut 30, 1890	$25,000 00
2. Instruction in all other subjects, if any, not mentioned in question 1 of this series	---- ----
3. Administrative expenses (salary of president, secretary, treasurer, etc.; clerical service, fuel, light, etc.)	18,448.57
4. For buildings and repairs	25,954.17
5. Experiment station	16,972.08
Total	$86,374.82

VII. Property, year ended June 30, 1902.

Value of all buildings, $120,000; of apparatus, $3,500; of machinery, $17,000; of library, $------; of other equipment, $------.

Value of above property not used for instruction in the subjects specified in section 1 of act of August 30, 1890: Buildings, $50,000; of other equipment, $3,500.

Total number of acres in farm and grounds, 198.91; acres under cultivation, 109; acres used for experiments, 50; value of farm and grounds, $20,000.

Number of acres of land allotted to State under act of July 2, 1862, 90,000; acres still unsold, unknown; value of unsold land, unknown.

Amount of land-grant fund of July 2, 1862, $131,556.37; amount of other land-grant funds, $------; amount of other permanent funds, $------.

Number of bound volumes in library, June 30, 1902, 3,270; pamphlets, unknown.

VIII. Professors and Instructors during the year ended June 30, 1902.

	MALES.	FEMALES.
1. College of Agriculture and Mechanic Arts:		
(a) Preparatory classes	--	--
(b) Collegiate and special classes	23	7
(c) Total, counting none twice	23	7

2. Number of other departments, none.
3. Number of staff of experiment station, 13.

IX. Students during the year ended June 30, 1902.

	MALES.	FEMALES.
1. College of Agriculture and Mechanic Arts:		
(a) Preparatory classes	33	5
(b) Collegiate classes	275	123
(c) Post-graduate courses	3	7
(d) Short or special courses	10	32
Total, counting none twice	321	167
2. Number in all other departments—Farmers' Short Course	27	3

3. Number of students that pursued courses in agriculture, 64; mechanical engineering, 106; civil engineering, none; electrical engineering, 11; mining engineering, 107; chemical engineering, none; textile industry, none; architecture, none; household economy, 90; veterinary science, 9; dairying, 64; military tactics, 321.
4. How many students graduated during year ended June 30, 1902? Men, 20; women, 12.
5. Average age of students graduated during year ended June 30, 1902, 21 years 1 mo. 4 days.
6. What degrees and how many of each kind were conferred in 1901–1902?
   On men, B. S. 20.
   On women, B. S. 12.
7. What and how many honorary degrees were conferred in 1901–1902? None.

(Signed:) THOS. M. GATCH, President.

(Date:) June 16, 1902.

DEPARTMENT OF AGRICULTURE.

The change made in last year's catalogue, deferring the work in Stock Breeding and Feeding from the Junior to the Senior year, left me but one class, that of Veterinary Science. In this work I gave instruction to nine young men for three terms. In addition to class room exercises, subjects were provided for work in clinics.

I also gave special lectures to the Freshman class during their work in the study of Breeds of Livestock, on types, individuality, and the relation of animal form to function. This was supplemented with instruction in stock-judging, both by the score card system and judging by comparison.

An excursion was planned for the class to visit Mr. C. E. Ladd's Yamhill county stock farm and a number of the students availed themselves of the opportunity to inspect a number of very high class stock and to observe the conditions under which they are maintained.

It is important that the students in Agriculture be skilled in animal husbandry for the agricultural wealth of the state rests largely upon the success of this industry.

Special lectures were delivered before the class in the Winter Short Course in Agriculture upon the common diseases of domestic animals and other popular topics relating to animal husbandry and general agriculture.

I take pleasure in calling attention to the generous donation of funds not to exceed $250, made by Hon. R. A. Booth for the purpose of defraying the expenses of students visiting the prominent stock breeding farms during their work in Breeds of Stock, for the coming year.

JAMES WITHYCOMBE.

DEPARTMENT OF HOUSEHOLD SCIENCE.

Sewing, the industrial work of the freshman students, has been as satisfactory as usual, with this gain to its advantage, that a larger per cent have finished the required standard than in former years, which presages a growing interest in the homes of the state in this womanly craft, by sending up daughters better prepared to complete the work.

General hygiene, which is given in the form of conversational lectures once a week at the sewing hour, brings us into the realm of

hope, which we may indulge to the belief that many of them may be set to thinking along lines that lead to healthier, happier, more lovely lives than as yet find expression on God's glorious earth. I would that our own, with every other educational institution, would make the physical basis of life of first importance. The thoughtful physician recognizes in the criminal classes which terrorize our civilization, how far below the normal standard of mental and physical health are those who crowd our penitentaries and insane asylums.

Etiquette is given in the form of talks at the sewing hour, with drill in memorizing some of the important rules which must govern the members of all enlightened communities in their intercourse with each other.

This is a subject of no small importance and should find a place in all our schools for it is "conduct, science, beauty, manners," which differentiate us from the savage, and "are the powers which tend to build up human civilization."

The sophomore women students report for their industrial to the dressmaking department in charge of Mrs. Avery.

The juniors in cooking find in the ten or twelve bulletins issued at Washington, D. C., on the subject of food, and in Mrs. Lincoln's text-book on cookery sufficient mental work to occupy the time given this subject. Demonstration lessons, with the aid of students, is the practice work as yet possible with our present equipment.

Experiments have been made with prunes to a limited degree. It is quite interesting to note by inquiry how few really eat prunes with a liking for them. A large per cent of those who were questioned on the subject, admitted a distaste for the fruit in any form as a sauce. If they ate them at all it was with medicinal inclination. When sugar coated with the whites of eggs and whipped cream they found them very palatable; as fruit added in the place of raisins in puddings they were agreeable. It has set us to wondering where all the Oregon prunes are to find a market. Certainly they are not for home consumption for a small per cent of Oregon palates crave this mumified fruit. We regret having to make this statement when prune growing is one of the industries of our state.

In bread making we have experimented in shortening the process of fermentation, which is really a destruction of good food material, also in evolving a good quality of raised brown bread that is baked. We thus eliminate the hurtful sour milk and soda combination.

Some valuable experiments in cake making have also been made. The results of these experiments will shortly be given in the domestic column of some woman's club journal.

The senior class work in æsthetics is of the highest mental and moral value. Here the student is no longer left to "wander about in worlds not realized;" here she learns to know herself and something of her relation to the forms about her in the natural world, and in the world of art; here she learns to recognize all form in the universe as ideas of God—in the world of art, as man's ideas, seeking expression of himself to his fellowmen. This highest expression of his being is found in what is termed the Fine Arts—the arts of discourse, architecture, music, painting, sculpture, landscape, and occupy two terms' work. An acquaintance with each of these great avenues of expression is a matter of great importance to men as well as women, for it familiarizes one with the highest output of human power, and teaches the possibilities of the mind and spirit.

The work in domestic lectures includes talks on what to do in emergencies, the home treatment of the sick as to baths, compresses, packs, poultices, etc.

The Ethics of Marriage is the text-book work in special hygiene. This is supplemented with talks and readings on the subject of heredity and kindred topics of importance to women in whose hands lies the weal or woe of the millions; who have the power of setting the seal of health, or blight, on their offspringto the third and fourth generation.

MARGARET C. SNELL.

DEPARTMENT OF MECHANICAL AND ELECTRICAL ENGINEERING.

It is always our aim to bring theory and practice as close together as possible. In the study of mechanics of engineering, the student takes up the application of pure mathematics to engineering problems, learns to distinguish between the purely ideal and that which is proved by actual test.

In steam engineering the principles of thermodynamics are studied and compared with results attained in practice. The structure and design of steam engines and boilers as well as their care and management are learned by means of text-books and lectures. The measurement of power with the steam engine indicator and Prony brake becomes familiar both in theory and in practice.

No material change has been made in the methods of instruction, nor has the equipment been increased except in the blacksmith shop where an exhaust fan with the necessary piping and hoods was installed during the early part of the year. This has proved to be a valuable addition since it keeps the shop free from smoke and dust. The motive power for the exhaust fan is supplied by a twelve horse-power electric motor, constructed in the college shops, utilizing the frame and pole pieces of a dynamo, which was burned in the old mechanical hall.

The work of reconstructing this machine was taken in hand by Prof. Hayward, and all of the work was done by him and Mr. Phillips.

Two members of the senior class undertook the design and construction of two vertical engines, rated at four horse-power each, as their thesis work. Their designs and patterns were made principally in vacation and before they had studied the subject in class; hence quite a number of defects appeared when it was too late to remedy them. However, the work was nearly completed when school closed and, all things considered, it may be classed as creditable.

ELECTRICAL ENGINEERING.

In electrical engineering excellent work has been done by Prof. Hayward. The regular class room work is supplemented by laboratory practice, including the measurement of resistances of insulators, localization of faults in submarine cables, and construction of apparatus for the laboratory.

The classes in this department have had considerable practical work in electrical engineering during the past year. We might mention the following work:

Wiring the pharmacy building; wiring the Y. M. C. A. building; wiring and removal of 100 lights in the armory for the Choral Association; wiring quantitative chemical laboratory; wiring in physical laboratory, botanical laboratory, art room, and mathematical department.

Two members of the senior class constructed a large induction coil as their thesis work, the college furnishing all materials and the coil is now a part of the laboratory equipment. Everything about this piece of work appears to be first class and it is certainly a valuable addition to our laboratory. The actual outlay was

about thirty dollars in money, while the instrument is equal in finish and utility to one costing $100. Two other members of the senior class designed and built a 2½ horse-power electric motor for the use of the chemical department. Some old material from a burned dynamo was utilized but the design and construction were mostly new. This was also finished, tested and is now ready to install. Its market value is about $150 while the cost of new materials used was about $40.

MECHANICAL DRAWING.

During the past two years the work in mechanical drawing has been considerably improved. Instead of spending one term on the solution and construction of geometrical problems, the student begins at once to make drawings of real objects such as small parts of machines. From this the work rapidly progresses to that of making complete working and detail drawings as well as tracings and blue prints. A text-book is used as a book of reference but in no sense as a copy.

BLACKSMITHING.

In the blacksmith shop, the usual course of instruction in forging, welding, and tempering has been given. The aim is to have students do work which is in line with their several courses.

The agricultural students pay special attention to making and repairing such things as are most likely to be needed on a farm. The students in the mining course make a specialty of dressing and tempering picks, drills and other tools for rock cutting. Some very good work has been done in making polished hammers, picks and other tools.

WOODWORKING.

The work of students in the woodworking department consists largely of exercises involving the use of the most common tools used by a carpenter as well as instructions for keeping such tools in order. Students who show suitable proficiency in the work are called upon to make tables, cases and small articles as needed about the college. During the past year several of the senior class elected advanced woodwork for their practicums and turned out some very creditable work in the shape of patterns for the foundry, cabinet work, and turning.

OTHER WORK.

In addition to the work done by classes under their direction, Messrs. Hayward, Phillips, and Prichard have done a great deal of work for the college in other ways. I might mention some of the more important services rendered by them as follows:

Mr. Hayward and Mr. Phillips working during vacation and many times at night, successfully completed the twelve horse-power electric motor to run the exhaust fan in the blacksmith shop. The value of this motor is not less than $250 while its cost to the college was about $150.

Mr. Hayward has also constructed a number of pieces of apparatus for the laboratory and power house besides installing electric lights in the chemical laboratory and administration building. He has also kept the bell circuit in working order and repaired the local telephone and electric light circuits.

In addition to the regular work done by him in class, Mr. Phillips has also done a great deal of outside work which would otherwise have demanded the services of a skilled mechanic. Some of this extra work is as follows:

Work on college well; plumbing in pharmacy building; putting in wash basin and fixtures in art room; making drawings and blue prints of plans for exhaust piping and hoods for blacksmith shop; work on silos, fitting hoops and putting in steam pipes; repairs to water pipes after freeze; sharpening paper knife for printer, etc.

Mr. Prichard has also done considerable work in his line, outside of class work. Some of the principal items are:

Repairs to steps at Cauthorn Hall, Alpha Hall and chemical building; fitting up rooms for Prof. Crawford and Prof. McKellips; putting transoms in Mechanical Hall; making cases for the departments of mathematics, art, and chemistry; work on silos, besides numerous small jobs and repairs.

While this report does not enter into details to a great extent, it gives a fair outline of what we aim to do and what has been done during the school year just closed.

Much credit is due to the efficiency and fidelity of the assistants, who are associated with me in this department, for the result set forth in this report.

G. A. Covell.

We used "Hodgeman's Manual of Land Surveying." The student was required to read this book and to use it as a guide in his field operations but very little time was given to recitation in the class room.

The first third of the term was devoted to familiarizing the student with the principles, adjustments and uses of the various instruments. The instruments were tested and adjusted in the field and the student was taught to set up the instruments, read angles by the use of the vernier, etc. The remainder of the term was devoted to practical surveying as much as possible. One of the first problems taken was the re-location of an old line and the re-establishment of a lost corner. It so happened that this problem involved about as many difficulties as the surveyor would be liable to encounter in practice.

We next re-surveyed two city blocks near the college re-establishing the lost corners, calculating the content and subdividing them into lots, writing the necessary description of each subdivision and platting and blue-printing the same.

Next we undertook an elaborate survey of the college property, locating, for mapping purposes, all the improvements, buildings, walks, heat mains, sewers, gas and water pipes, etc. Great care was exercised in the work and numerous checks were applied and the work thoroughly proved. I had intended having the class do all this work, including the mapping, but we did not finish for lack of time. The students laid out, from the plans, several buildings in College Hill addition. In all cases the work was done with care and precision.

Considerable practice was had in the use of the level. Among other things a line of levels was run by a number of students from the college to a point on Oak Creek, a distance of about three miles, with the object of determining the feasibility of this creek as a source of water supply for the college. Three members of the class expect to take this for the subject of their thesis next year in which case they will complete the surveys, make the necessary test as to quality and quantity of the water and make the maps and plans for a water supply system for the college. They will make all the engineering plans preliminary to actual construction. It will in-

volve quite a lot of work. On several occasions I had students assist me on Saturdays in making the necessary surveys for some of the sewers of Corvallis and in doing some country and farm surveying, the student getting good practice as well as earning wages.

GORDON V. SKELTON.

DEPARTMENT OF CHEMISTRY AND PHARMACY.

THE COLLEGE—DIVISION OF WORK.

During the college year the chemist's time has been devoted almost entirely to experimental station work. The only time spent in teaching was during the winter term while the Farmers' Short Course was in session. This arrangement of the college work left the chemist free to devote nearly his whole time to station work. This plan seemed to give the best results both to station and college work.

Practically all of the teaching has been done by Assistant Professor J. F. Fulton and Instructors C. M. McKellips and F. E. Edwards.

Assistant Professor Fulton devoted his entire time to college work and none to station. Instructors McKellips and Edwards devoted part of their time to station work; during the college year Instructor Edwards devoted approximately one day per week to station and the remainder of his time to college work. Instructor McKellips devoted most of his time to college work, but at intervals helped out on station work.

CHANGES DURING THE YEAR.

During the early part of the year the department of pharmacy was moved from the Administration building to the frame building formerly occupied by Prof. Coote as a residence. The work in assaying was transferred from this frame building to the building at present occupied by the station chemist. Both of these changes were very satisfactory.

APPARATUS ACQUIRED DURING THE YEAR.

During the year the pharmacy department acquired one Enterprise mill for grinding samples of drugs, also one tincture press. One analytical balance was bought for student use in quantitative

analysis. Numerous small pieces of apparatus, such as beakers, mortars, thermometers, spatulas, evaporating dishes, etc., were also obtained, these pieces of apparatus being necessary for student use in the general laboratory.

SUGGESTIONS.

As the college grows and as the work in chemistry increases we feel the need of more assistance. When the college can afford to have another member added to the teaching force in chemistry it is suggested that he be well informed along the lines of plant analysis, organic chemical analysis and pharmaceutical analysis.

INSTRUCTORS' REPORTS.

In order to give a more detailed account of the work performed by the instructors there is appended to this report those of Assistant Professor Fulton and Instructors McKellips and Edwards.

A. L. KNISELY.

MINING.

In the fall term I gave instruction in mineralogy to 7 students 6 of whom were seniors and one special. The instruction lay along the lines of determinative mineralogy and consisted largely in blowpipe analysis and the study of the physical characteristics of the more common minerals, the idea in mind being a thorough training in identification and classification with the aid of simple instruments, most of the minerals found in the geological horizons of the Pacific slope. Beside the minerals, of which there were 72, the students were made acquainted with the gangues and matrices that usually accompany the above, which in my opinion, enhanced the value of their knowledge of mineralogy and also encouraged them to observe and endeavor to classify such specimens as they found in the occasional jaunts when time would permit.

The three months' course of four hours per week is rather short for a very extensive study of the various minerals but with the diligence with which it was attacked by the last class it seemed, to me at least, sufficient for a fair introduction to assaying, the principles of which only mineralogy can elucidate.

This has been the most satisfactory year in the study of assaying. something like 38 specimens of ores have been examined by dry as-

say by each student for gold and silver and about 12 each for iron, copper, and zinc. This amount I believe is equal to that given by an institution that pretends to offer a course in that subject. I am thoroughly satisfied with the grasp that the outgoing class seems to have of the art.

The junior class in medical chemistry consisted of only 6 members, therefore more individual attention was given to each student than is possible when the class is larger. The first term's work consisted of physical chemistry, followed by the chemistry of inorganic salts in their application to pharmacy. Upon the completion of the non-metals, which was at the expiration of the fall term, the class was placed in charge of Mr. C. M. McKellips, instructor in pharmacy. Pressure of work in other directions compelled this transfer.

The junior class in agricultural chemistry consisted of 8 gentlemen and 1 lady, and had for study the Relation of Scientific Agriculture to Modern Chemistry. After discussing various classes of soils with respect to both physical and chemical composition, the manner in which the best physical results could be obtained, the various methods of maintaining fertility, the process by which moisture could be conserved, the good and bad effects of fallowing, the reclaiming of impoverished land, the effect of chemical manures and of barnyard manures, the composition and economic value of artificial fertilizers, the value of green manures, the chemical and physical effect of drainage, the subject of nutrition with the chemical composition of various grasses, seeds and roots and their feeding value, the compounding of rations for animals under different conditions, and milk and its composition received due attention.

The junior class in organic chemistry consisted of 27 members. The time given to this subject is altogether inadequate. No sort of a course can be given with any degree of satisfaction in six weeks. Other institutions of this grade give at least 12 weeks and many 6 months. A superficial knowledge can only be acquired and from my experience I am fully of the opinion that most students, especially the ladies, can use their time to better advantage than be required to read as broad a subject of which they only receive a smattering in the alloted time. All that I can hope to impress upon the students is the peculiar nature of carbon in that it has the power to unite with itself under different conditions, forming an endless number of compounds; the difference between saturated and

unsaturated compounds and to show that oxygen and nearly all other non-metallic, as well as metallic, elements can unite with or replace individual atoms or groups to form alcohola, acids, aldehydes, ethers and organic salts. The processes of sythesis and analysis, of determining molecular weights, of fractional distillation in its application to purification, etc., are explained as fully as time will permit.

The carbohydrates, especially the more common starches and sugar, receive perhaps the greater attention.

The senior class in quantitative analysis numbered 5. They completed work in determining iron, aluminum, magnesium, phosphorus, sulphur and silicon in the respective compounds. They also completed the elements of volumetric analysis. Two members of this section extended the usual course to enable them to prosecute their thesis "On the variability of butter fat with respect to feed." The results, while not conclusive, go far to show the character of the work that may be done in this department, even by undergraduates.

The senior class of young ladies in chemistry of foods numbered 6. It was only elected for the first term, during which a reading course with laboratory instruction was given in the relation of human food to nutrition. These 6 young ladies chose thesis work along some of the lines of this work. Two elected Analysis of Baking Powders; two, Loss of Fermentation in Bread; and two, Analysis of Breakfast Cereals, all the results of which were generally satisfactory.

The section in senior pharmacy numbered 8. The required time for this work is 10 hours per week throughout the year, during which an elementary course in quantitative analysis to teach them how to use the balance, etc., is given, the balance of the time being spent in assayiug crude drugs and in identifying poisons. Three members of this section elected thesis work in this department—two, on active constituents in Oregon grape and one on "Digitalis."

The sophomore class in general chemistry numbered 67. In the routine work of teaching this subject during the past year I found it necessary to supplement to a large extent the text-book with explanatory notes, the latter taking the form of lectures of which, with about 15 minutes of questioning on the previous lesson, I delivered 3 each week to each section. For the mechanical section I deemed it necessary to prepare special notes so that they might ob-

tain as much as possible in the alloted time. I am fully convinced that with our prospective increased facilities an even greater proficiency will be obtained. JOHN FULTON.

PHARMACY.

In the pharmacy department the year's work has been very satisfactory. The number of students enrolled in this department is 52, of whom 34 are Freshmen, 8 Sophomores, and 5 each, Juniors and Seniors.

The student takes up the strictly pharmaceutical branches of study in the Junior year, during the first term of which a series of lectures acquaints him with the theory of pharmacy and the scientific principles upon which it rests. In the second and third terms the lectures are accompanied by a very comprehensive laboratory course in which each student is taught the correct method of manufacturing from crude drugs and chemicals all the important and difficult preparations of the U. S. Pharmacopœia.

In the winter term of the Junior year the subject of Pharmacognosy is taken up and studied during two terms. Herein the student learns the scientific classification of the crude organic drugs of both animal and vegetable origin, together with the habitat, the part of the plant or animal used in medicine and the various common names or synonyms by which it is known. An interesting division of the work in Pharmacognosy lies in the training of the senses in the recognition of these crude drugs when no label or other mark of identification accompanies the container.

The Senior year begins with lectures and recitations upon the subject of incompatibilities in prescription filling. The laboratory practice during the first term is largely a continuation of that of the Junior year, attention being confined to the manufacture of only those preparations requiring the highest degree of manipulative skill.

During the second and third terms much time is given to the compounding of prescriptions. In this branch of the work much pains have been taken to make the course of instruction very practical—the student is thoroughly drilled upon those points of technique that will be of every-day benefit to him in the store.

The subject of Materia Medica is taken up at the beginning of the winter term and carried through the remainder of the year. The therapeutical activity of all medicines that are in use is studied in this connection. In the case of vegetable drugs investigation is made concerning the plant principles to which the medicinal activity is due.

The subject of Toxicology—the study of poisons, the symptons they produce, their antidotes and treatment—occupies a prominent position in the schedule of the spring term; attention is also given to the provision of the Oregon Pharmacy law concerning the sale and dispensation of poisons.

An interesting, as well as important feature of the senior pharmacy student's duties, lies in the preparation necessary for the final examination before the State Board of Pharmacy. It is necessary for him to be successful in this examination before he can secure a certificate of registration allowing him to prosecute his profession within the limits of the state. The pharmacy graduate is unique among his fellows of the other departments, because of this regulation.

The Secretary of the Board of Pharmacy has upon several occasions expressed himself as being well pleased at the showing made by our pharmacy students in their examinations.

C. M. McKellips.

CHEMISTRY.

I have the honor to submit the following report of work done as instructor in chemistry during the past year:

Fall Term.—Qualitative analysis, 3 classes, 35 students.

4 hours each week - - - -	12 hours
Preparation for above classes - - -	4 "
Total hours per week - - - -	16 "

Winter Term.—General laboratory, 4 classes, 86 students.

4 hours each week - - - -	16 "
Qualitative analysis, 1 class, 6 students.	
4 hours per week - - - -	4 "
General chemistry, 19 students, 1 class.	
3 hours per week - - - -	3 "
Preparation for above classes - -	6 "
Total hours per week - - -	29 "

Spring Term.—General laboratory, 4 classes, 70 students.

4 hours each week - - - -	16 hours
General chemistry, 1 class, 13 students.	
3 hours per week - - - -	3 "
Preparation for above classes - -	5 "
Total hours per week - - -	24 "

FRANK E. EDWARDS.

DEPARTMENT OF BOTANY.

The work of the department of botany and horticulture for the past year has been almost entirely confined to teaching. The steady increase in attendance together with the gradual broadening and advancing of the courses of studies has greatly increased the class room work in this department during the past year. As an example of the requirements in this direction I may cite the work of the third term just closed. One hundred and five (!) students were given instruction. These included members of the Freshmen, Sophomore and Senior classes. In all there were six classes daily except for one month of the latter part of the term, the seniors being relieved of regular class work by substitution of field work. The three classes in Freshman year agriculture and household science, and the one class in Freshman year pharmacy required of the instructor besides the regular class quiz and discussion, a daily examination of detail drawings and written work pertaining to the subject. These drawings and notes for the whole term numbered over 1800 plates, each of which contained on an average, one general and six detail sketches, many of them being more or less elaborate, thus making an exhibit of 12,600 drawings each of which required at least two inspections, one for the purpose of suggesting corrections, and the other for final approval. The notes accompanying these drawings comprised a discussion of a series of observations upon plant structure and plant life. The total number of pages of written matter was a few over 5,000.

The class in second year pharmacy, consisting of 9 students followed a similar course of work so far as drawings were concerned except, that while the drawings in Freshman work is made to cover types of twenty or more leading orders of plants, those in second year pharmacy are confined to the types of medicinal and poison-

ous plants. The figures and illustrations in the work of the past year comprised twenty plates for each student with figures varying from four to eight on each plate. Elaborate notes accompany the work describing at some length the character of the plant, its medicinal properties, how obtained and the use of same.

The work in advanced horticulture, an elective for seniors, covered a discussion of the principles of plant evolution and plant breeding as evidenced by, and effected through, our more common cultivated plants. This course also contemplates the performance of some original work in the investigation of problems pertaining to plant growth, germination, fertilization, effect of soils on root action, etc. The equipment of the department, however, does not permit the full realization of the outlined work.

A word more perhaps about the character of the first year work in botany may be of interest at this time. The purpose of the course is to give the student a good working knowledge of the grass structure of plants, their distribution, association, the ways in which they perform the work they have to do, how they live, and their relationship.

The second and third year work enters into a study of the minute structure of the plant and the ways in which the various organs of the plant perform their several duties. Plant physiology is an important subject to the man who has to do with plant life from an agricultural, horticultural or forestal standpoint. And such instruction as the equipment of the department will bear out is given with especial reference to these aspects of plant culture.

Plant physiology like animal physiology cannot be intelligently discussed until the student has a good understanding of the anatomy of the plant. Through a course of microscopic investigation coupled with full and complete drawings of the structures studied the student obtains this information.

Besides the regular work in the course, a short course series of 21 lectures upon botanical and horticultural topics was given. Compilations of accumulated data relative to pollenation were made. The plant and seed collections of the department have been largely increased (the figures not being at hand now.) The answering of queries still continues to grow, over 300 letters having been written during the year upon this phase of the work.

The department needs for teaching equipment $150 worth of

apparatus, largely for physiological purposes, there being at present no special apparatus for this phase of the work.

E. R. Lake.

DEPARTMENT OF FLORICULTURE AND GARDENING.

On June 19th work was commenced on the new walk leading from the Mechanical Hall to the entrance on the south side of the campus near the Corvallis and Eastern depot. This new walk was very much needed to accommodate the very much increased travel in that direction after the completion of the new Mechanical Hall. This work was done at odd times as other work on the grounds would permit. The work of constructing the walk was done in the following manner: The ground was plowed to a depth of eight inches on either side and twelve inches deep in the center; after taking out the soil a ditch was dug six inches deep, and a three-inch tile drain was laid in the center the whole length of the walk. This was then covered over with coarse gravel thus making a perfect quick drainage from surface of walk to tile. During the month of July and August gravel was hauled onto the walk. This work was done by our own team with occasional help from farm team. During August about thirty yards of decomposed granite was placed on surface of walk. The help received from the farm team was repaid by our team which helped haul silage and hay, and also helped haul at intervals during the harvesting of grain on the farm.

The most of Mr. Herzig's time was taken up during the spring and summer months mowing lawns and keeping walks in good order. At times it was necessary to employ student labor to help in this work. During vacation three students were hired to assist in all of the above work.

During the latter part of August and the beginning of September the granite that was not used on the new walk was placed on the surface of old walks, as follows: The walk leading from the north entrance of Executive building to the back and front of Mechanical Hall; thence from Mechanical Hall along walk leading to blacksmith shop; also on road on south and walk north of Executive building.

In July and August the main carriage driveway was widened four feet. This was done by taking two feet of earth from either side of

the road. Two hundred feet of three-inch tile drain was laid on the side of this road about one hundred feet on either side. Then the lower part of the road was permanently graveled, commencing at the point with the junction of the crosswalk leading to C. & E. depot. For this purpose to every four loads of gravel one load of loam was mixed in order to help bind the gravel. This has proved the ideal way of treating our river-bottom gravel, as every particle of earthy matter has been washed out of it, and it is impossible to get it to bind down without something in the way of loam as a mixture. This causes a little extra expense, but in the end pays well, as labor is saved in keeping the road smooth. It has been proved that simply placing a coating of mixed loam and gravel over the loose gravel will not answer, for the constant travel will bring the loose gravel to the surface and the heavy rains will wash the fine soil below it. Consequently to prevent this, the gravel and loam should be well mixed together before using. When this method is employed much time and annoyance are saved.

I omited to state that the teams were very busy hauling grain to the thresher at the time the granite arrived, therefore the City Dray Companies were hired to haul granite from depot to avoid paying demurrage on car.

September—Oak Creek Gravel.—During August 29, 30, 31, gravel was hauled from Oak Creek to surface the road back of Executive building so that we might do away with the loose rolling stone. The gravel from the above creek is of such a nature that it binds well and is better to walk upon than the river gravel but it cannot be had in great quantities. There were 53 loads of gravel used on the road about Executive building and road leading to Mechanical Hall. Ten loads of gravel were hauled to repair bad places in road next to power house.

Cleaning Cross Ditch.—The first week in July the ditch across the campus was cleaned out and made level on the bottom.

Avenue.—During July and August water was hauled onto the newly planted trees and the surface soil kept well cultivated around each tree. By this means the trees all made a fair growth during the summer.

Moving Earth. The work of removing surplus earth from the ditch where the heating pipes had been laid was commenced on July 16th. This earth was placed on each side of new granite walk at the southwest entrance for the purpose of raising the ground so that

trees and shrubs might be kept out of water during the winter. There were in all 27 loads of earth moved. This work lasted from the 16th to the 23d, owing to other work having to be done, such as hauling brick to be used in new dry-house, and hauling stakes for prune trees to be used in the Johnson orchard.

Potting Earth.—On the thirty-first of August soil was collected and piled up with equal parts of rotten manure for the purpose of potting. This work took three days. During the early part of September all flower beds and borders had to be hoed and put into respectable order, also the campus had to be mowed.

September 19th being McKinley Memorial Day, a large maltese cross was made, composed of asters and ten-week stock, to be used in the opera house.

State Fair Exhibit.—Being appointed to take charge of the exhibit at the Salem state fair, I had to be absent from college duties from the 20th to the 24th of September. After setting up the exhibit I returned to the college. At this time the station orchard began to take up some attention in the way of caring for the fruit. During the months of October and November work was discontinued on the campus, with the exception of keeping it in order and planting narcissus bulbs around borders and laying sod on each side of the new walk. The sod was cut from the grass patch north of the horticultural building.

Rose Propagation.—In the early part of December twenty-two varieties of roses were placed in propagating beds on the ground adjoining the old cottage, about two hundred and fifty in all. These are all doing well at this writing and will come in good play for the adornment of the campus. About one hundred and fifty common laurel were also put in.

Making Boxes for Plants.—At such time when the weather was too stormy for working on the grounds large square and hexagonal boxes were made. These were given a coat of green paint and served admirably for such plants as palms, ferns, etc. In all two dozen have been made. I take this plan to save expense, as large earthen pots are always breaking and are not satisfactory.

At this time the dead leaves on the grounds were taken up and piled in a bin constructed for the purpose at the back of horticultural hall. It is quite essential that this be done every year in order to supply the department with leaf mold for potting purposes.

Removing Large Evergreens.—Whenever the weather would per-

mit trees and shrubs were removed from borders and beds wherever they had become overcrowded, and planted in convenient places on the campus. Several of these trees had to be taken with large balls and therefore had to be removed with the team with the help of four men; also had to use block and tackle to lift them from the holes. These trees range from 6 to 12 feet high. The varieties run as follows: Black walnut, maple, box, English laurel, cypress, lawsoniana, arborvita, common fir, blue spruce, buckeye, alanthus, rhododendron, hickory, dogwood, Judas tree, and forsythia.

At every opportunity the team was kept at work hauling manure from town. This was placed in piles so that it might be composted and ready for any use for which it might be wanted during the spring and summer. A number of loads have also been spread and harrowed in on the campus at the east and south entrances and along the sides of the walk leading to the Mechanical Hall. This was done in order to encourage the sod to take a hold so that the entrances to the grounds might become more attractive. By hauling manure from town during winter it can be had mostly for hauling, whereas if left until spring opens up it is in great demand and twenty-five cents per load is generally charged.

February—Repairing Tools.—During this month patent fertilizer was sown on the lawn south of Executive building, also on east of same. When the weather would not permit Mr. Robinson to work outside, hauling manure, etc., being a blacksmith, his time was employed in mending up all tools that needed repairing, making gratings for drains, washing flower pots, and whatever work was necessary to be done.

March.—At the beginning of this month all palms in hot house had to be thoroughly cleansed from scale and other insects. This was done by spraying the plants with tobacco water and tar soap, being well sponged afterward. The above work was done when the weather was such that outdoor work had to stop. At odd times several new hanging baskets have been made and a number of plants newly potted for the season. On the eleventh, Mr. Herzig began work again after being laid off for some time. Work in orchard had to be attended to, such as pruning and grafting, and all hands were set to work so that we could make good time while the weather was good. At this time we began sowing varieties of vegetable seeds for testing in the garden. The latter part of the month was taken up in potting up geraniums, fuchsias and other plants that needed it.

April.—During the early part of the month all walks were edged and a general clean-up was made as far as other work would permit, such as work in orchard and hop garden. Two beds of La France roses have been planted on either side of the walk at the east entrance to college campus; and the cutting of grass on lawns had to be commenced. All this has taken up much time of the men. Whenever opportunity offered I myself was out with spade and hoe to help on and to push the work in order to have the campus look as respectable as possible under the shortage of help. The surface earth on the drain over the steam heating pipe has been hauled off and grass and white clover seed sown. And the harrowing of the campus has been done with the team. Several hundred seedling plants had to be pricked off into boxes, both of flower and vegetable plants. At intervals when the weather was such as to prevent working out on the grounds, Mr. Herzig was washing pots. Mr. Robinson worked at the small forge and sharpened harrow teeth. When fine, his time was taken up in hauling wood for heater, and plowing orchard and berry patches. Herzig continues mowing grass on lawns and borders. All men assisted in general work on ground whenever opportunity offered.

May.—The work through this month has been such as mowing lawns and trimming edges of walks and weeding same. Owing to the very showery season the weeds have, in some instances, overgrown us, as it was impossible to keep pace with them owing to the shortness of labor. Some few loads of manure have been hauled from town during the month whenever the time would permit. The work of spading flower beds and borders has been done, stocks and asters pricked out into boxes from the seed pans. A good deal of the time has been taken up with teams hauling wood for heating plant and power house. The grass was cut on the campus for hay. Owing to the wet weather this work has been greatly retarded.

June.—Commencing with this month plants have been planted into the beds and borders, the work being in the way of keeping the grounds somewhat respectable.

Plants and Shrubs.—I am sorry to have to report that in nearly all cases where flowering shrubbery has bloomed this year the students and others have completely ruined the plants by injudiciously plucking them when in bloom. May I plead for some ruling that will help in a great measure to stop such depredations.

George Coote.

APPENDIX.

Floriculture.—During the winter term I taught the junior household economy class, numbering 28 and divided into two sections, consuming 112 hours.

Farmers' Short Course.—I also delivered before the Farmers' Short Course people ten lectures and gave practical work in pruning, budding and grafting all kinds of fruit, ornamental trees and shrubs, and also gave lectures on the best methods of cultivating all vegetables and variety of succession of crops.

Landscape Gardening.—In the spring term I took the senior household economy class in landscape gardening. The time consumed was 42 hours.

DEPARTMENT OF BACTERIOLOGY.

In accordance with the requirements of the catalogue, during the past school year the senior students in pharmacy have pursued a course in bacteriology under my instruction, and several other students, by your permission, were allowed to join the class.

I am pleased to be able to report very gratifying results of their work. The first term's work taught them the underlying principles of bacteriology and a beginning in laboratory technique. The second term gave them a comprehensive understanding of the bacterial diseases of stock and poultry. They were familiarized with the organisms causing these diseases by inoculating guinea pigs with cultures. They studied the symptoms, and after death, the post mortem appearances of the lesions produced, and the seat of the disease was carefully noted, thus giving them a clear conception of the cause, nature and possible remedy of the infectious diseases in domestic animals.

The large number of pathological specimens sent to the laboratory from different parts of the state, enabled the student to observe the methods employed in diagnosing contagious diseases, such as blackleg, swine plague, hog cholera, tuberculosis (bovine, avian, and human) infectious pneumonia, glanders, anthrax, actinimycosis, and many other diseases of stock and poultry.

The use and value of blackleg vaccine was demonstrated by the use of guinea pigs and an intense interest in this work was manifested by all.

The third term's work consisted of a thorough investigation of

the comparative value of disinfectants and their uses. The students were required to find the minimum amount of disinfectant that would inhibit the growth of pyogenic germs planted in an artificial media to which the disinfectants had been added.

The bacterial analysis of water, the study of nitrifying germs in legumes, finding, making pure cultures, and classifying yeasts, all entered into their required duties.

The knowledge which the students have gained from this work will be of life-long benefit to them and considering the importance of this modern science, I beg to recommend that each student who graduates from this institution shall have had one year's training in this subject.

During the farmer's short course a series of lectures, with laboratory demonstrations, was delivered upon the following subjects:

Bacterial diseases of poultry, bacteria in the dairy, bacteria in relation to agriculture, vinegar making, hog cholera, blackleg in cattle, swine plague.

Furtunately during the course, several specimens from diseased animals were received and diagnosed before the class, which was both interesting and instructive to them.

My duties on committee work have been discharged to the best of my ability.

E. F. Pernot.

MILITARY DEPARTMENT.

Organization.—The cadet corps consists of an infantry battalion of four companies, with staff and non-commissioned staff; a band of twenty pieces, and a platoon of artillery. The infantry has been increased one company during the year.

Equipment.—At the beginning of the year the equipment consisted of two three inch muzzleloading field pieces and 200 Springfield cadet rifles with complete set of accoutrements, all belonging to the United States. The college owned fifteen swords, the battalion colors, several band instruments and some band music. This equipment was found to be insufficient, and at your request the Board obtained from the national government 100 cadet rifles, ten swords and twenty cavalry sabres, all with the necessary accoutrements. All of the above mentioned ordnance is in good condition and will be enough to fully equip all the cadets during the next year.

You kindly purchased for the department 200 patent rifle racks which were placed upon the walls of the armory. These have proved very much more convenient and serviceable than the wooden racks previously used. I would recommend the purchasing of 100 more of these racks for the new rifles lately procured.

Enrollment.—Total number of cadets enrolled in military department during the year, 304. Excused from drill: Post graduates, 3; completed military course, 1; Spanish war veterans, 4; physically incapacitated, 4; special and music students, 5; total excused, 17; total male students in college, 321; largest number of cadets on the rolls at one time, 283; number actually drilling at end of college year, 204. These figures show a marked increase over previous years.

Attendance and Discipline.—The interest which the cadets have shown in the military work has been excellent throughout the year. The discipline has been good. It has been necessary to reprimand only one cadet, and that for inattention at drill.

The percentage of attendance at drill has been larger than during the previous years of my command in the department. This is principally accounted for by the new system of excuses for absence lately adopted by the faculty.

Instruction.—The instruction has been both theoretical and practical and all time allotted for military purposes has been utilized to the best advantage.

Theoretical Instruction.—The theoretical instruction during the first term consisted of weekly recitations in the drill regulations as far as the school of the battalion. Each company commander was required to conduct the recitations for his officers and non-commissioned officers and was held accountable for the instruction of the cadets under his command. This gave each company a more stable organization and a confidence which helped much to increase the efficiency of the cadet corps on the drill ground.

During the winter three weekly recitations were held in the school of the battalion in close and extended order, ceremonies and guard duty.

Weekly lectures were given to junior cadets on military organization and equipment, and to senior cadets on army administration, battle tactics, and other military topics. The artillary officer held weekly recitations in artillery regulations for his non-commissioned officers throughout the fall and winter terms.

Practical Instruction.—This instruction included the practical application on the drill field of everything studied in the class room. The drill periods were each forty-five minutes in length. The number of drills per week were: 1st term, four; 2nd term, three; 3rd term, five. The school of the soldier, the company and the battalion; the squad, platoon, company and battalion in extended order (skirmish drill); and the ceremonies, including parade, review and guard mount, have all been practiced as thoroughly as time would allow. Considerable drill was had in the latter ceremony and the officers became about as familiar with the subject as was possible without actual camp duty. Some time was also devoted to the formation for street riot drill.

It has been the aim during my command of the department to make the military instruction practical rather than showy. I have looked upon the work as a military school in which the upper classmen are instructors and the newer cadets recruits to be taught all the military duties found in actual service in the army. I have tried at all times to place as much responsibility as possible on each cadet officer that he might be free from embarrassment in any position in which he might be placed.

Target Practice.—Target practice has been held on Saturdays during the spring term whenever the weather would permit. About 85 cadets, mostly seniors and juniors, have practiced during the season and much improvement has been made in marksmanship. All target exercises have been conducted according to the U. S. small arms firing regulations.

Two target contests were held during commencement week. The annual junior shoot was won by cadet sergeant S. L. Burnaugh with a score of 96 points out of a possible 125. He received the junior medal provided last year by you. Last year Lieut. (then sergeant) N. W. Leadbetter won this medal with a score of 93 points. The second contest was an intercollegiate affair with the following schools, representing all parts of the United States, entered:

Oregon Agricultural College, Corvallis, Oregon.
Iowa State University, Iowa City, Iowa.
Mass. Agricultural College, Amherst, Mass.
University of California, Berkeley, Calif.
University of Wisconsin, Madison, Wisconsin.
Virginia Polytech. Institute, Blacksburg, Virginia.

The contest was at a range of 200 yards, off hand, each team to compete on its own range and forward certified scores to the judge of the contest. The O. A. C. team made a total of 367 points out of a possible 500 which is considered very good at that range. The results of the contest have not yet been announced.

Band.—The cadet band of twenty pieces has advanced rapidly in efficiency during the year, and much credit is due to those who have had the leadership and instruction. The college furnishes all the music and about one third of the instruments. The other instruments are furnished by the cadets of the band.

Drill Ground.—During the year the movements of the battalion of infantry and the platoon of artillery have been much hindered for want of a suitable drill ground. The college campus is too much taken up with trees and shrubbery to use as a parade ground and I would recommend that if possible some plat of ground, not too far from the armory, be set aside to be used exclusively for drill purposes.

Target Range.—During the past two years, through the kindness of Mr. James Hayes, a target range has been improvised just east of Scott's hill. This is a very suitable range but it is probable that Mr. Hayes will have other use for his land in the future. Also parties, through whose property it is necessary to pass, in order to reach the range, have objected very strenuously to its use. The distance is another objection to this range, it being at least two miles from the college.

In view of the interest manifested by the cadets in target practice, the liberal amount of ammunition furnished by the government, and the practical results already obtained in marksmanship, I would recommend that a suitable target butt for ranges up to 500 yards be constructed at some convenient spot on the college farm. Such a butt could be constructed without any considerable outlay of money.

Honor Cadets.—It is the duty of the military instructor to report annually to the Adjutant General of the army, and to the Adjutant General of the Oregon National Guard, the names of the three graduating cadets who stand highest in military attainments. Those recommended this year are: Cadet Captains Herman V. Tartar, Airlie, Polk county; Arthur Edgar Tully, Wallowa, Wallowa county; and Chester W. Laughlin, North Yamhill, Yamhill county.

Camp Equipment.—Two years ago, through the courtesy of Brig. General C. U. Gautenbein, Adjutant General Oregon National Guard, the department was supplied with tentage enough for encamping the entire cadet corps. I was then enabled to give the cadets three days of instruction in camp which greatly aided in supplementing the military knowledge gained in the class room and on the drill field. Since that time the government has passed regulations which forbid state officers issuing military supplies to other than national guard organizations. In view of this ruling there has been no cadet encampment for the past two years. I would recommend that the Board of Regents try, through the aid of our senators and representatives at Washington, to obtain from the quartermaster department U. S. army, sufficient camp equipage that the cadet corps may encamp at least three days annually. Such supplies cannot be obtained in the regular way in whlch rifles and other ordnance are secured.

In closing this report, I take the opportunity to thank you for the very manifest interest which you have shown in the military department, and especially for the efforts that you have put forth at all times to provide the department with that found to be necessary to equip it and make it serve to the best possible advantage the purpose for which it was established.

Frank E. Edwards.

DEPARTMENT OF PHYSICAL EDUCATION.

The instruction in the department of physical education includes a rigid physical examination at the beginning of the year. Using this as a basis a special set of exercises is prescribed for each student to develop weak and unsymmetrical muscles. The first term is largely devoted to body building work to increase the strength of the entire body. Records are kept of each student's examination that the actual gain may be known.

Later in the year wrestling, boxing, tumbling apparatus work and basket ball are taught to all who desire but all continue the regular class work.

Early in January special work is again prescribed for men who look forward to spring athletics. An annual gymnastic display is given at the end of the winter term.

The physical work for the women is similar to that for men but

less vigorous. Games are encouraged for all who are strong. During the first and second terms of the sophomore year the Swedish system of gymnastics is taught alone. The rest of the course is occupied by instruction in club swinging, marching, running, wands, dumb-bell and easy apparatus work.

J. B. Patterson.

LITERARY COMMERCE DEPARTMENT.

The Business course was instituted only last September. It was originally designed for a two year course. The subject of bookkeeping was made one of the leading courses extending throughout the entire two years.

The plan followed was, in the beginning, a simple presentation of the principle of debits and credits as illustrated in an ordinary cash book. This was followed by a plain form of ledger as a book of original entry which could be easily adapted to the ordinary business of the farm, shop and store. Then a day book was introduced from which the debits and credits were posted to the ledger. A form of statement, setting forth the condition of the business at some stated period, regularly followed the closing of the ledger. This statement showed the condition of the business—the resources and the liabilities and the gains or the losses. Following this simple work, the usual business forms—notes, checks, drafts, orders, acceptances, etc., were presented and the students required to do original work in the practical application to business as met with in their class work. The first term was thus occupied. At the opening of the winter term the subject of double entry was taken up in order. This was followed in the usual manner and with the usual forms.

No attempt was made to introduce any of the so-called "world of business" devices. The underlying thought was to give the students a well grounded idea of the relation of debits and credits as set forth in the simpler forms of the text-book. It is assumed that if the student has acquired a clear conception of the theory of debits and credits he will find little difficulty in adapting his school room work to the ordinary requirements of business.

From the very first work done, the student has been encouraged to be neat and orderly in his work; to improve in his penmanship; to be accurate in his calculations. During the year Prof. J. B. Horner had direct supervision of the penmanship—giving practical lessons to the classes every week—two and three exercises to each class.

According to the course as planned last year, the subjects of typewriting and stenography will be taken up next year.

The subjects of arithmetic, algebra, English and kindred matters were taught by the regular teachers. T. H. Crawford.

REPORT OF THE DIRECTOR.

President T. M. Gatch:—

DEAR SIR:—I have the pleasure to present herewith a report of the agricultural department of the Station for the year ending June 30, 1902, with reports of the Station Chemist, Entomologist, Bacteriologist and Floriculturist.

The general horticultural work of the station during the past year has been under the supervision of the Florist, details of which will be found in his report.

An investigation of great economic value to the horticultural interests of the state has been undertaken by the station chemist in his efforts to solve some chemical problems relating to the evaporation of fruits. The results of this preliminary work are shown in the report of the department of chemistry.

The other problems important to the horticultural industry have been undertaken conjointly by the departments of chemistry and entomology—(1) Experimentation with various commercial fertilizers and cover crops; (2) Investigations, reinforced with numerous experiments, for determining the cause and the discovery of preventives of the disease in the Italian prune tree commonly known as curl leaf. For this work the station has been very fortunate in securing the use of the five-acre prune orchard owned by Mr. B. W. Johnson of this city, the only expense being that incurred in its proper cultivation.

The station staff for the past year has worked mainly on practical subjects which were of immediate pecuniary interest to the agricultural classes. Examples of these are indicated in the chemist's report of his work in the evaporation of fruits, chemical study of silage, and soil analysis; in the report of the entomologist of his work in curl leaf, bacterial diseases of strawberry plants and fungous diseases of wheat. The work of the bacteriologist has been directed along practical lines in the investigation of bacterial diseases of domestic animals and poultry.

The report of the entomologist of the investigation of plant diseases may convey the impression of an intrusion on the province of

the horticulturist. This, however, is the result of an agreement between the two departments that work relating to plant diseases should be assigned to the department of entomology.

In addition to the regular research work of a scientific character conducted by members of the station staff, a demand is made upon their time to investigate special difficulties which confront the farmer. While these interruptions in some instances may, in a measure, retard the regular work, still it is gratifying to realize this growing confidence among the farmers in the ability of the station to render them valuable aid in many important agricultural problems.

FARMERS' INSTITUTES.

There is a growing demand for more institutes. During the past year nineteen farmers' institutes have been held under the auspices of the station. Number of sessions 55. Aggregate attendance basing calculations upon maximum attendance for one session at each institute, 3,335 persons.

Members of the staff, in addition to institute work, have attended during the past year and taken part in eight other agricultural and horticultural meetings, comprising stock breeders' conventions, dairymen's and farmers' gatherings.

The station has issued during the past year five bulletins, namely—"Birds of Oregon," "The Codling Moth and Late Spraying in Orĕgon," "Testing Milk and Cream," "Stagnant Water Germs in Milk," "Preliminary Report on Steamed Silage."

Receipts from sales of stock, farm and dairy products during the year, $1,033.15.

AGRICULTURAL DIVISION.

This department has continued the experiments with leguminous crops, which was taken up a few years ago. These crops are grown for a threefold purpose—(1) for demonstration to farmers, (2) for their economic value as stock food; (3) for the improvement of the physical condition of the soil. The results of this work are very satisfactory. A perceptible increase in the yield of all classes of cereals invariably follows the growing of these leguminous crops in rotation with grain. For more technical work four systems of rotary cropping were started last year on four one acre plats. A very careful account is kept of the cost of production of each crop and each plat is credited with the value of the crop produced. At

the end of the year composite samples of soil are taken from the plats and analyzed. The data secured from this work after a series of years should prove a valuable guide to the farmer in adopting proper systems of rotation of crops for his farm.

The work in alfalfa growing is continued and while we have not met with phenomenal success with the growing of this plant on a practical field scale, nevertheless, the results are encouraging. With the object of testing the feasibility of growing alfalfa in drills and cultivating it, one acre was sown in this manner this last spring. The purpose of the experiment is mainly to secure data as to the amount of alfalfa that can be produced by this method of growing. There are large areas of land in the eastern portion of the state which receive an insufficient amount of rainfall for the growing of alfalfa in the ordinary way; also the contour is one which precludes practical systems of irrigation. It is thought that by systems of cultivation sufficient moisture can be conserved to support a profitable crop of alfalfa, and if this method proves successful large tracts of land which are at present of little value may be transformed into desirable farms.

The varietal test of cereals is continued but in a more restrictive form than in past years. The aim of the department is to confine this work more strictly to the testing of new varieties which give promise of value rather than to permit the work to assume the character of a display.

The grass garden has served its purpose and the land devoted to this work in the past has been turned over to the horticultural division.

Out of one hundred varieties of grasses sown in 1890, there are only fourteen remaining at the present time. Instead of maintaining a grass garden at considerable expense to the station simply for display, new varieties of grasses only will be tested in the future.

In the autumn of 1898 a mixture of thirty-three varieties, principally perennial grasses, was sown on a well prepared piece of land for the purpose of determining their value under conditions prevailing here. On June 16th of the present year a careful collection of the varieties was made and only nine varieties could be found, namely:—Agrostis vulgaris (Red top); Poa pratensis (Kentucky blue grass); Dactylis glomerata (orchard grass); Lolium perenne (Perennial rye grass); Anthoxanthum odoratum (sweet vernal grass); Lolium italicum (Italian rye grass); Phleum pratense

(Timothy); Holcus lanatus (Mesquit grass); Arrhenatherum avenaceum (tall oat grass).

While this single test should not be regarded as conclusive it does, however, furnish a fair indication as to the probable varieties best suited to this soil and climate.

Semi tropical plants.—The southern cow pea seems to be of no practical value here. So far they have failed absolutely to produce seed. Slightly better results have been secured with the Soja bean, although the yield has not been satisfactory. The plant is of doubtful value for the production of seed for stock food, but owing to its habit of maturing at the same season as corn and being rich in protein, it may prove a desirable crop to mix with corn for silage, or can be ensiled alone.

CO-OPERATIVE WORK.

The station has continued its co-operative work with the National Department of Agriculture in sand-binding grasses at Gearhart Park. The work at this point is progressing satisfactorily, giving evidence that the reclamation of the sand dunes of the coast and lower Columbia is within the range of possibilities. It was planned to take up this work on the upper Columbia last spring but insurmountable obstacles prevented the consumation of preliminary arrangements in time for the work to be undertaken.

The station is conducting a co-operative test of Red clover seed, collected in different countries and states by the Bureau of Plant Industry of the National Department of Agriculture; also co-operative soil work with the Bureau of Chemistry.

In addition to this work with the National Department of Agriculture the station is co-operating with a number of farmers within the state in the growing of leguminous crops.

ANIMAL HUSBANDRY.

The stock feeding experiments during the past year were principally confined to the feeding of dairy cows and fattening swine.

Soiling has been continued during the summer and in addition to what green food the cows would consume, a portion of the herd was fed a liberal ration of mill feed, another portion a small amount and another portion received no mill feed. The purpose of this experiment is to determine whether the profits of dairying can be augmented by feeding liberal rations of concentrated feed

in addition to grass or other succulent forage. The results of this work have not yet been tabulated.

The experimental feeding of swine was undertaken for the purpose of determining the amount of live pork that could be secured from a given quantity of wheat. Pen No. 1 was fed a mixture of one-third peas and two-thirds wheat. The other two pens were fed exclusively upon chopped wheat. Water was kept in reach of the hogs at all times.

Pen No. 1 consumed during the feeding period 989.50 pounds of the pea and wheat mixture and made a gain of 197.50 pounds. Feed required for one pound gain 5.01 pounds. Pen 2 consumed 1039.50 pounds of chopped wheat. Gain in live weight 244.50 pounds. Feed required for one pound gain 4.25 pounds. Pen 3 consumed 2136 pounds of chopped wheat. Gain 387.50 pounds. Feed required for one pound gain 5.51 pounds. Pens 1 and 2 each contained two young hogs about 6 months old. Pen 3 contained three matured hogs.

MISCELLANEOUS WORK.

The work on silage, a joint effort with the department of chemistry, is perhaps the most important work the station has in hand at this time. The aim of the station is to secure a silage as free from acid as possible. Results so far, from the use of steam, are quite satisfactory and we have full confidence that what is known as the "Oregon method" will ultimately solve the problem of sweet silage. For specific data on this work see Bulletin No. 72.

EXPERIMENTS WITH THE USE OF GYPSUM ON CLOVER AND VETCH.

Three and one half acres of clover of uniform stand were divided into seven half acre plats.

Plat 1	Gypsum	25.00	pounds;	weight of green clover		13,220
" 2	none		"	"	"	12,105
" 3	37.50	"	"	"	"	12,260
" 4	none		"	"	"	12,295
" 5	50.00	"	"	"	"	12,475
" 6	none		"	"	"	12,575
" 7	12.50	"	"	"	"	12,740

There were four days intervening between the cutting of Plat 1 and that of Plat 7.

This ground received a moderate application of barn yard manure in the spring of 1900. A cultivated crop was grown that season

and the land seeded to winter wheat that fall. The clover was sown over the winter wheat early in the spring of 1901.

Two acres of fall sown vetch, of uniform stand, growing on what is known as white land, which has been devoted to the growing of cereals for a long period, were divided and designated as plat 4 and 5. Plat 5 received 100 pounds of land plaster April 17th, 1902, and yielded of cured hay July 11th, 1902, 9,031 pounds.

Plat 4 received no plaster and yielded of cured hay in the same date 7,394 pounds, showing in this instance a gain of 22 per cent in favor of the gypsum.

No perceptible results have been secured from the use of disintegrated granite.

The experimental work at Moro, Sherman county is continued. After a failure to grow vetch for two seasons, alfalfa has been substituted. Two half acre plats were sown with alfalfa. One plat was sown to the common alfalfa (Medicago sativa) broadcast. The other plat was sown in drills, one-half to Turkestan alfalfa and the other half to the common variety.

One of the most serious problems confronting the agricultural interests of the state is the subject of growing leguminous or humus forming crops in the non-irrigatable districts of the semi-arid portions of the state. The farmers are oblivious to the irreparable injury that will result to the land if the present popular method of farming be persistently continued. Land that is producing at present satisfactory crops of cereals will be transformed into desert wastes if some form of cropping cannot be devised to supercede the bare summer fallow.

ACKNOWLEDGEMENTS.

The station takes this opportunity to express its appreciation for the assistance rendered in the matter of transportation by the Southern Pacific, Oregon Railway and Navigation, Corvallis and Eastern, and Columbia and Southern railway companies, thus permitting us to accomplish a large amount of field work at a minimum expense to the station. Also thank Dr. E. N. Hutchinson of the Bureau of Animal Industry for his valuable assistance to the station in the securing of data on animal parasites and to Mr. John B. Stump for the donation of an excellent Cotswold ram.

Respectfully submitted,

JAMES WITHYCOMBE.

DEPARTMENT OF DAIRYING.

During the six weeks ending August 15, the department conducted a series of experiments in the testing of cream at three creameries in the city of Portland. The object of this work was to determine the following points:

Can the composite test be successfully used in the testing of cream?

What are the daily variations in test of cream delivered at factories?

Should cream samples be weighed or measured volumetrically in making fat tests?

How should the cream test sample be taken from the amount delivered?

The results obtained in this work are set forth in Bulletin 70 of this station.

In cooperation with the department of bacteriology, some work was carried on in the inoculation of cheese made from equal parts of skim milk and butter milk, with flavor-producing germs. The results indicated that such process was of little value.

Further work with the same department in the inoculation of full cream cheese with flavor-producing germs was interfered with by the removal from the curing room of the cheese by parties unknown to the department.

During the months of November and December tests were made of the milk of five cows of the college herd. Each milking of each cow was tested separately with the object of obtaining data on the variation in fat content of morning and evening milkings. Very wide variations were found at times.

Since January first daily tests of the entire station herd have been made with the object of obtaining data on the subject of variation in fat content of the milk from day to day as changes occur in the season and in feed conditions.

Throughout the year a complete record has been kept of the milk yield of the cows in the station herd. This record shows that the station is in possession of some very promising two year old Jersey heifers.

In the matter of farmers' institute work, the department has been represented at all such meetings held under the auspices of the station, with perhaps two or three exceptions. F. L. KENT,

Asst. Agr. and Dairy Instructor.

DEPARTMENT OF CHEMISTRY.

The work of the year has been mostly a continuation of the previous year's work. One of the principal features of the year has been the work done with silage—a detailed description of this being given in Bulletin 72 "A Preliminary Report on Steamed Silage."

SOILS.

Considerable work is being done upon soils, making soil analyses so as to determine the amounts of total and available plant food present.

A sample of so called "white land" from Lane county gave the following results:

	No. 2087
Acid soluble potash (K_2O)	0.12 per cent
" " phosphoric acid (P_2O_5)	0.02 "
" " lime (CaO)	0.03 "
Total nitrogen (N)	0.05 "

This is a very poor unproductive soil. Two samples of Canby prairie soil gave the following results:

	No. 2239	No 2240
Total potash (K_2O)	1.14 per cent	1.47 per cent
" phosphoric acid (P_2O_5)	0.47 "	0.36 "
" nitrogen (N)	0.39 "	0.41 "

These Canby prairie soils are exceedingly rich in plant food. Two samples taken at Mt. Angel, Oregon, one at 1,000 ft. elevation and the second at 2,000 ft. elevation contained the following amounts of plant food:

	1000 ft. elevation. No. 2020	2000 ft. elevation. No. 2021
Acid soluble potash (K_2O)	0.20 per cent	0.30 per cent
" " phosphoric acid (P_2O_5)	0.43 "	0.30 "
" " lime (CaO)	0.10 "	0.15 "
Total nitrogen (N)	0.17 "	0.30 "

These soils contain below the average amount of potash and lime but are very rich in phosphoric acid. They contain slightly more than the average amount of nitrogen usually found in upland soils. An examination of two soils from Springbrook, Ore. One favorable and the other unfavorable to cherries were examined and results are as follows:

	Favorable. No. 2053	Unfavorable. No. 2054
Acid soluble potash (K_2O)	0.21 per cent	0.10 per cent
" " phosphoric acid (P_2O_5)	0.17 "	0.35 "
" " lime (CaO)	0.28 "	0.19 "
Total nitrogen (N)	0.15 "	0.20 "

A sample of soil from a new field at Hubbard, Ore., analyzed as follows:

	No. 2096
Acid soluble potash (K_2O)	0.30 per cent
" " phosphoric acid (P_2O_5)	0.40 "
" " lime (CaO)	0.45 "
Total nitrogen (N)	0.16 "

Some of the richest and most fertile soils of Oregon are the so called "Beaver Dam Soils." The total plant food in these soils is as follows:

No.			Nitrogen per cent	Phosphoric acid per cent	Potash per cent
1853	Beaver dam soil	Washington county, Oregon	1.46	0.07	0 94
1884	"	" "	1.69	0.15	0.26
1885	"	" "	2.29	0.16	0.21
1839	"	Marion county	1.70	0.25	0.27
1880	"	" "	1.95	0.20	0.27
1881	"	" "	2.62	0.28	0.23

The work on moisture in soil is being continued. This work is done both at Moro, Oregon, where the soil plats are located, and at the Experiment Station where the determinations of moisture in the soil samples are made. Samples are sent weekly to the station.

The plat experiments at Moro, Sherman county, Oregon, have been under way for three years. At the present time these plats are being treated as follows: Plat I common alfalfa sown broadcast. Plat II north half common alfalfa in drills, south half Turkestan alfalfa in drills. Plat III spring wheat. Plat IV bare summer fallow.

The moisture determinations which have been made thus far this summer are as follows:

Date	Plat I per ct moisture	Plat II per ct moisture	Plat III per ct moisture	Plat IV per ct moisture
May 23	11.93	12 13	11.34	13.07
" 30	10.93	10.54	10.20	10.98
June 6	9.63	10.94	8.23	10.19
" 13	8.10	9.41	7.13	10.40
" 20	6.29	7.61	5.82	10.20
" 27	6.00	6.48	5.70	10.43
July 3	7 94	7.62	6.75	11.40
" 10	5.82	7.64	5.08	10.59
" 17	5.12	5.95	4.81	9.76

This table shows that plat IV contains very much more moisture than any of the other plats. This is due to two things: first, the plat has been thoroughly cultivated during the season and second, this plat contains no crop to draw upon the soil moisture.

The annual precipitation in this region is very small ranging about 10 inches. With this amount of rainfall the soil never leaches. Hence in this region no loss of nitrates results from the bare summer fallow. The present system of grain and bare summer fallow will in a short period of years exhaust the soil. The problem to be solved in this region is to introduce a system of crop rotation which will best utilize the scanty rainfall and at the same time do away with the suicidal practice of grain and bare summer fallow.

PRUNE INVESTIGATION.

During the prune drying season much work was done with prunes

and considerable data was accumulated. Various methods of drying were employed, the object being to ascertain the best method of drying prunes. This work will be continued this fall. It is hoped that the results of this work will be valuable and of enough interest to warrant publication.

The fertilizer work upon the prune orchard is being continued this year.

The details of the prune work will be given in bulletin form. Prunes were dried at temperatures varying from 120° Fahr. to 200° Fahr. Samples of the dried prunes are at the present time stored in the fruit house. Some lots have "sugared" very much, others are bright and glossy and almost appear as if they had been "processed." One of the prune-drying problems is to dry prunes in such a way that they will not "sugar" and it is believed that the station can solve the problem if anybody can.

In connection with the prune-drying experiments, some work was done with drying apples and bleaching them *without the use of sulphur*. Apples were pared and sliced in the usual way and then dipped in very dilute solution of salt water, then put upon trays and dried. The finished product was bleached perfectly. This method will be tested thoroughly this fall.

While the fruit drying investigation was under way, the dryer was "fired" day and night. Six different sets of thermometers placed in different parts of the dryer were read every two hours. Both wet and dry bulb thermometers were used in order that the per cent of moisture in the air could be determined. This fruit drying work made necessary a vast amount of analytical work. In this one line of work

464	determinations	of	sugar	were	made
232	"	"	acidity	"	"
200	"	"	protein	"	"
50	"	"	ash	"	"

During the prune drying season many overripe prunes were dumped in a large vat and fermented for vinegar. (This work was in charge of the Bacteriologist.) As the prunes were fermenting and just at the end of the alcholic stage of fermentation, the chemist made an analysis and found over 10 per cent alcohol in the juice. A sample of this juice was distilled and the first distillate contained 65 per cent alcohol.

FERTILIZER EXPERIMENTS.

Many letters come to the Chemist asking about fertilizers and

what kinds are best suited to their land. These questions can best be answered by the farmers themselves if they only know how to go at the subject. The farmers should try various kinds and combinations of fertilizers and by actual experiment upon their own land find out which are adapted to their conditions.

This season we have started some experimental work with fertilizers near Toledo. The farmer (Mr. Rae) who is doing the work was carefully instructed how to proceed and by giving attention to his little experimental plats he will be able to tell this fall what kind of fertilizer his soil wants. Many questions come to the station concerning onion lands and the station is planning some experimental work on some of these lands in order to find out what they lack.

SYSTEMS OF CROP ROTATIONS.

The Departments of Agriculture and Chemistry are continuing the series of experiments on "Systems of Crop Rotations."

DRAINAGE EXPERIMENTS.

Near the college farm barn is located the "drainage pot experiments." This series of experiments has been continued two years and many interesting and valuable data are being obtained concerning "bare summer fallow" and "the leaching of soils."

The indications are that the "leachings" or drainage water from the bare summer fallow pot carry by far the most plant food.

MISCELLANEOUS ANALYSES.

During the year a great deal of time was spent and much work done in making miscellaneous analyses. These consisted of waters, soils, fertilizers, insecticides and similar substances.

In the miscellaneous line some valuable work was done upon the so called "red albumen" found in the poultry market. This material was sold for the purpose of making hens lay. The station examined several of these albumens and they were found to be frauds and some of them were practically of no value. No. 2247, sample "red albumen" obtained in Portland, said to be a wonderful tonic and egg producer, retails at about 40 to 50 cents per pound. In reality this article was worth not much more than 5c per pound.

No. 2252, sample of "red albumen" obtained from Ohio, said to be a wonderful egg producer and retailed at 60 to 75 cents per pound. This material was practically worthless as hen food.

No. 2260, sample "red albumen" obtained from Lebanon, Ore. This sample was dried blood and worth about 5 cents per pound.

Analysis showed the compositions of these materials to be as follows:

	No. 2247 Per cent	No. 2252 Per cent	No. 2260 Per cent
Protein	70.94	3.76	83.56
Ash	15.20	77.38	1.50
Iron (F_2O_3)	3.32	15.47	----
Lime (CaO)	7.84	33 61	----
Potash (K_2O)	0.44	-----	----
Phosphoric acid (P_2O_5)	0	1.99	----

The effect of the work upon these "red albumens" is best summed up in the words of one of our best wholesale firms of Portland. They say, "Your report on red albumen has killed its sale in our market."

Samples of Paris green were analyzed as follows:

	No. 1906 Per cent	No. 2367 Per cent	No. 2376 Per cent
Arsenious oxide (As_2O_3)	56.75	47.60	46.85
Copper oxide (CuO)	28.81	29.98	24.66

Pure Paris green should contain 58.64 per cent arsenious oxide
31.30 " copper oxide

It is seen therefore, that two of these samples fall considerably below the standard. For general spraying purposes Paris green should contain at least 50 per cent arsenious oxide.

A sample of water from the mineral spring at Sodaville which is owned by the state of Oregon, was analyzed as follows: 1000 cc. of this water contains 0.5964 grams of carbonic acid CO_2. Of this amount a large portion is free and begins to pass out of the water as soon as it runs from the spring. 1000 cc. of the water contains:

Potassiums sulphate	.0349	grams	or	34.9	parts per million	of water
Sodium sulphate	.0149	"	"	14.9	" "	"
Sodium chloride	1.1351	"	"	1135.1	" "	"
Magnesium chloride	.1982	"	"	198.2	" "	"
Calcium chloride	.3558	"	"	355.8	" "	"
Potassium carbonate	.0147	"	"	14.7	" "	"
Sodium carbonate	1.0318	"	"	1031.8	" "	"
Carbonate of iron	.0069	"	"	6.9	" "	"
Carbonate of alumina	.0454	"	"	45.4	" "	"
Silica	.0239	"	"	23.9	" "	"

Probably the silica, iron and alumina occur originally as silicates of iron and aluminum and the water which is highly charged with carbonic acid gas dissolves some of these silicates. This water seems to have many medicinal properties and is said to be beneficial for many bodily ailments.

At the request of Hon. Benton Killin, the Portland Canning Company canned some ever-bearing or evergreen blackberries by the same method they use in canning the tame or cultivated varieties. Both kinds of berries were canned in water and not sweetened.

After several months had elapsed the cans were opened at the station laboratory and compared as follows:

Evergreen Blackberries.
berries firm but not too hard
color very good
flavor better than cultivated berries
fruit acid 0.42 per cent
sugars 6.00 " "
protein 0.94 " "

Cultivated Blackberries.
rather soft and mushy and badly broken in pieces
color poor
flavor poorer than Evergreen berries
fruit acid 0.48 per cent
sugars 4.50 " "
protein 0.88 " "

When calculated to the water-free material, the acid, sugars and protein are as follows:

fruit acid 4.10 per cent
sugars 58.53 " "
protein 9.17 " "

fruit acid 4.90 per cent
sugars 45.92 " "
protein 8.98 " "

It must be understood that both kinds of blackberries were neither sweetened nor spiced in any way so that their good or poor qualities were due to the berries themselves. It would seem that the evergreen blackberry might be used commercially.

ANALYSES MADE DURING THE YEAR.

In order to give an idea as to the amount of station work done during the year and also to show its increase over last year the following table is appended:

	Year ending June 30, 1901.	Year ending June 30, 1902.
Number of determinations of moisture	148	460
" " solids (by difference)	65	200
" " ash	67	113
" " protein	148	244
" " crude fibre	42	97
" " ether extract	44	67
" " nitrogen free extract (by difference)	28	50
" " acidity in silage	70	155
" " acidity in vinegar	26	136
" " acidity in prunes		151
" " nitrogen in soils	16	16
" " potash	35	85
" " phosphoric acid	21	89
" " humus	6	12
" " preservatives	65	17
" " cane sugar	15	350
" " glucose	6	200
" " starch	12	50
" " color materials (dyes)	7	2
" " casein	6	46
" " fat	5	10
" " volatile fatty acids	2	4
" " sulphur	3	11
" " chlorine	8	34
" " free ammonia	8	10
" " albuminoid ammonia	5	31
" " arsenic in Paris green	3	7
" " copper	8	3
" " gold and silver	18	0
" " zinc	1	0
" " lead	1	0
" " calcium	1	67
" " sulphuric acid	1	13
" " gluten	2	0
" " volatile matter	2	6
" " fixed carbon	2	6
" " carbon dioxide	0	24
" " alcohol	0	6
" " nitrogen in water	0	104
" " iron and alumina	0	35
" " solids in vinegar	0	35

		Year ending June 30, 1901.	Year ending June 30, 1902.
Number of determinations of solids in water		0	24
" "	sodium	0	5
" "	magnesium oxide	0	6
" "	silica	0	5
" "	nitrogen in fertilizers		15
" "	chromium	0	6
" "	asphaltum	0	8
Total		898	3014

LABORATORY ASSISTANCE.

During the year the Chemist was assisted principally by Major Edwards and Mr. Tartar who gave valuable aid to the station work. During the middle part of the year Mr. McKellips gave a small portion of his time to station work.

APPARATUS.

During the year little or no apparatus was obtained for experiment station work in chemistry. In connection with the Horticultural Division considerable money was expended in the prune drying investigations.

A. L. KNISELY,
Chemist.

DEPARTMENT OF ENTOMOLOGY.

The work of the department has continued along much the same lines as are indicated in former reports. At the beginning of the year I was much disappointed and the work of the department more or less interrupted by the loss of my assistant, Mr. F. M. McElfresh, who resigned to become superintendent of one of the largest fruit orchards in the state. Mr. McElfresh had come to us from the University of Illinois and in the two years that he was with us had shown himself to be very capable both in the classroom and in the field. I was, however, very fortunate in securing the services of Mr. W. T. Shaw, a graduate of the University of Minnesota, who had had experience as an instructor in the agricultural colleges of Michigan and Iowa. Through an arrangement provided for by the Board of Regents at its last annual meeting, I have turned practically all of the teaching in the department over to Mr. Shaw, who has maintained an interest in the work on the part of his classes that speaks well for his ability as an instructor. By this arrangement I have been able to devote the most of my time to a line of investigations which has proved to be more than usually interesting by reason of the new problems which have presented themselves.

However, the work of one year is so related to the work of the preceding and succeeding years that much of the work undertaken during the year is still incomplete, while much of that undertaken in past years is still unpublished, notwithstanding the fact that two bulletins, aggregating one hundred and sixty pages were published during the year, as follows: Bulletin 68, An Annotated List of the Birds of Oregon; Bulletin 69, The Codling Moth and Late Spraying in Oregon.

The first was mainly the work of Mr. A. R. Woodcock, a graduate student, who had been making a special study of the birds of this locality for several years.

In addition there has also been published from the department a small pamphlet entitled "Nature Study in the Public Schools." This was designed as an introduction to the nature study movement which was authorized by the Board of Regents at its last annual meeting and was for distribution to the teachers of the state.

The investigations carried on during the year may be roughly divided into two classes—those mentioned in previous reports and which are still being continued; and new lines of work undertaken during the year. Of the latter the following are the most important:

XYLEBORUS DISPAR.

The past year has witnessed the outbreak of another imported fruit tree pest within the borders of the state.

June 4, 1901, Mr. Geo. Lamberson, Secretary of the State Board of Horticulture, forwarded to me from Portland for identification, some sections of small apple limbs infested with a small borer. On examination I was surprised to find both males and females of a Scolytid beetle which I identified as the European *Xyleborus dispar*. No further report of the appearance of this new pest was received until April 24, 1902, when Mr. Lamberson again sent specimens with the report that they were the supposed cause of the death of some three or four hundred bearing prune trees in the orchard of Mr. Geo. Flanders at Vancouver, Washington. Following close upon this report came information of its destructive work at Oregon City, Oswego, Russelville and Mt. Tabor and other localities in the immediate vicinity of Portland.

To be certain I had made no mistake in identifying the pest, I sent samples to Dr. A. D. Hopkins, a special student of the Scolytidæ, who replied that they were "typical specimens of *Xyleborus*

dispar," agreeing almost exactly with specimens in my collection from France, Germany and England, but differing from the eastern forms identified by some authors as *dispar*, but which I have referred to *X. Pyri*. Peck. Dr. Hopkins also advised me that this species might become a serious pest under the conditions prevailing here and expressed the opinion that the outbreak should be thoroughly investigated.

In the meantime, however, I had visited Mr. Flanders' orchard at Vancouver and Mr. Steel's place near Oregon City and found that this insect was responsible only to a slight degree for the injury that had been reported. In Mr. Flanders' orchard the three or four hundred trees had been killed by a mushroom fungus, probably *Agaricus* sp. Work of *Xyleborus dispar* could be found in only a comparatively few trees, all of which showed a decided lack of vigor due to other causes. Practically the same conditions, so far as *Xyleborus* injury was concerned, were found at Mr. Steel's place—only trees that were evidently dying had been attacked.

It now appears more than probable that this new importation will serve only as an agent in the more quickly ridding the land of unthrifty and therefore unprofitable trees. However, it is possible that under our climatic conditions it may develop into a serious pest. I am, therefore, giving some attention to studying its habits and to preparing a brief illustrated article that will enable orchardists to recognize it and its work.

A BACTERIAL BLIGHT OF STRAWBERRY.

October 19, 1901, Mr. S. Lindley, Lebanon, Oregon, brought me some strawberry plants that appeared to be suffering from a bacterial blight. Many of the leaves were entirely dead, dark brown in color and leathery in texture. On others, the dead areas of greater or less extent were situated between the principal veins which were bordered on either side by irregular areas of living green tissues. Blackened and shrunken areas were also observed on the stems. In some instances only one or two small areas were present upon a stem while in others these areas had spread and coalesced to such an extent that nearly or quite the entire stem was involved.

Whether the disease attacks first the roots and thence invades the stem and leaves, or first attacks the tips of the leaves, I could not definitely determine from the specimens submitted for examination, although the latter seemed to be the case since its presence was first

indicated in many instances by the wilting and death of the distal portion of a leaf. However, in a number of cases isolated dead areas were observed upon a stem, particularly at its base, when there was no evidence that the leaf itself had been attacked. Mr. Lindley reported that of 9000 plants transplanted in the spring (1901) not less than 2500 had been killed by the middle of October. He reported that the plants are growing in a good soil that is in fine condition, and the large size and remarkably thrifty appearance of the healthy plants would indicate that this must be true. Mr. Lindley also reported that the disease appeared in several places in his field, from each of which it spread, killing nearly every plant in its path.

A careful microscopic examination of the diseased plants failed to detect any fungus that could be considered responsible for the injury. Neither could any serious insect injury be found. However, a little sap pressed from the cut end of a diseased stem, upon a sterilized cover glass and stained with methylene-blue, revealed immense numbers of a bacterium—evidently a Micrococcus. Oct. 21, plate cultures on neutral nutritive gelatine and neutral potato agar were prepared. On gelatine, a faint growth could be detected in 24 hours; in 48 hours a decided growth of a milk-white color could be observed, and by October 25 the colonies had spread well over two of the three gelatine plates and were of a pearly or greyish-white color. No growth occurred on the plates of potato agar.

From these plate cultures pure tube cultures in nutrient gelatine were prepared on October 25th and on October 28th four healthy strawberry plants which had been potted several days previously were brought into the laboratory and inoculated. Two of the plants were inoculated by puncturing the leaf petioles and the blades with a flamed needle which had been dipped in the tube cultures. One was treated by watering the soil with a solution of a tube culture in distilled water, while the fourth was treated by dipping one-half its leaves in a similar solution.

The dry air of the laboratory caused all of the plants to wither considerably. No evidence of the disease appeared upon either the leaves dipped in culture solution or upon the plant which had been watered by the solution. Neither did any diseased areas develop upon any of the leaves that were punctured, but several of the petioles developed characteristic diseased areas from which plate cultures similar to the original were successfully made.

Two other plants were then potted, inoculated by puncturing the petioles as above, and placed under bell jars to retard transpiration. In 48 hours diseased areas were noticeable about a number of the punctures and these continued to spread until both plants died. During the progress of the disease all of the characteristics of the original plants received from Mr. Lindley were exhibited.

On receipt from Mr. Lindley of information that the strawberry blight had appeared again, I visited his place June 27, 1902. I found the strawberries growing in a rich sandy loam, well drained and in good cultivation. Most of the plants were large, vigorous and loaded with ripening fruit. The injury caused by the disease last season was still plainly visible in the areas of one to several rods square throughout the plat in which the plants had been killed and others transplanted in their places this spring (See III). These young plants were apparently all healthy and vigorous but scattered throughout the plat, mostly on the margins of the areas of destruction, were many older plants that had been more or less blighted this spring, a considerable number of which were dead (See III). Mr. Lindley had observed the disease for ten days or two weeks before writing me but at the time of my visit it had ceased to spread. No freshly blighted plants could be found, all diseased leaves being dry and brittle. From Mr. Lindley I learned that the disease in all probability attacks first the tips of the leaflets, since the first appearance of injury is shown by the terminal portion of the leaflet becoming limp and flaccid "as though it had been dipped in boiling water." The diseased portion becoms larger and larger until the entire leaf and then the stem are involved, leaf after leaf being thus invaded until nearly all are killed. So far as I could determine at the time, the roots were not affected and in nearly every instance a few small green leaves were pushing out from the crown.

I also learned that the disease had appeared in another plantation about one-fourth of a mile distant.

From a number of plants which were collected and brought to the laboratory, gelatine plate cultures were obtained which agreed in every particular with those obtained from the original plants submitted by Mr. Lindley.

This disease appears not previously to have been recorded, at least in this country. Dr. Stone * has described a disease of strawberry

* Rept. Hatch Expt. Sta., 1896, p. 59.

plants which he found to be due to a Micrococcus. He considered the disease of but minor importance since the disease was observed only one season and then only upon young plants which "had all the appearance of plants which had not become firmly established in the soil." The primary cause of the disease was thought to be a weakened condition of the plants, which together with climatic conditions, rendered them susceptible to the sporadic attack of an organism which is not unlikely common but which usually does no noticeable injury. It was also thought that the organism gained entrance to the plants through the roots.

The disease which I have had under observation seems to be more virulent than the one studied by Dr. Stone. While it made its first appearance in fall on plants that had been transplanted the previous spring, the plants had fully recovered from the check due to transplanting and were unusually large and vigorous. It has furthermore appeared this spring on two year old bearing plants. That the two organisms are distinct is evident since Dr. Stone described the one he had under observation as anærobic, while the one I have studied is distinctly ærobic. Whether the disease is to be considered a serious enemy to strawberry culture, or like the Massachusetts disease, is only a sporadic attack of some common organism which will rarely do any injury, can not be told at present. From the cultures now on hand an attempt will be made to learn something more of the habits of the organism and of its cultural characteristics. In the meantime I can only recommend, as a precautionary measure, the destruction of all plants which show indications of this disease.

CALIFORNIA CRUDE PETROLEUM.

In the spring of 1901, a series of experiments designed to throw some light on the cause and prevention of Italian prune leaf curl, were carried out in the orchard of Mr. B. W. Johnson. These experiments are being continued the present season and the general results are not ready for publication. However, some unexpected results were obtained by spraying the trees with California crude petroleum, which seem worthy of record.

Early in July five thrifty Italian trees loaded with fruit were sprayed with ordinary fish-oil and water in proportions varying from 5 to 25 per cent. of oil, to test its value in checking transpiration from the leaves. Five other trees were similarly sprayed with

California crude petroleum in like proportions. In both cases the oil was applied by means of a "Kerowater," a pump manufactured especially for the purpose of spraying plants with a mechanical mixture of oil and water in various proportions. Only a few trees were used for each experiment as it was fully expected that the trees would be seriously injured if not killed.

In 48 hours it was evident that the foliage on the trees sprayed with fish-oil had been badly injured. The oil had collected in drops and under each drop the tissues had been killed. Later these dead areas dropped out, giving to the leaves the appearance of having been badly injured by shot-hole fungus. Contrary to expectation, however, the injury did not increase as the season advanced. The foliage remained sticky and dirty and the bark of the larger limbs was dark in color and oily, but the leaves did not fall nor turn yellow and October 23, when the trees were photographed (see III) were dark green in color. The fruit matured and was of good size but was somewhat oily in appearance and odor. No serious injury to the tree has since developed.

At no time during the season could there be detected any injury, whatever, from the use of crude petroleum, even on the tree sprayed with a 25 per cent. mixture. The foliage and the bark of the trunk and branches retained a gummy residue throughout the season but if there was at any time any difference in the apparent vigor of the sprayed and unsprayed trees it was in favor of those sprayed with the crude petroleum. Their foliage seemed to be slightly darker green in color and more thrifty but the difference, if any, was slight.

While these experiments are only of a limited extent, they seem to indicate that in California crude petroleum we have a substance which may safely be applied to fruit trees (at least to Italian prune trees) in summer—a substance which remains as a gummy residue upon the tree throughout the season, and which may prove, therefore, to be of special value as a summer spray for all those minute insects which of necessity crawl over the surface of bark or leaf, like the young of various scale insects and many plant lice.

However, I learn from Mr. George Flanders, the Portland representative of the Standard Oil Company, that California crude petroleum is very variable, hence an extensive series of experiments will be necessary before we can arrive at a true estimate of its value as an insecticide. In the meantime orchardists who contemplate

using it should be cautioned that all of the various grades may not be equally harmless to trees.

A FOOT-ROT OF WHEAT.

Early in July I received from Mr. William Robinet, Halsey, Oregon, and from Mr. H. C. Jordan, of Albany, samples of growing wheat which were affected with some disease with which I was not familiar. Later the wheat on two or three small areas in the experimental plats on the college farm was found to be similarly affected. June 7, 1902, Mr. C. F. Jensen, Newberg, Oregon, wrote that last year his wheat had been badly injured with Hessian Fly and he had, in the hopes of avoiding the injury this year, followed my advice and practiced late sowing with the result that the grain sown last was very badly infested. I wrote Mr. Jensen, expressing surprise that the Hessian fly should show such a preference for the late sown grain and requesting that he send me for examination samples of wheat from both of the fields which were supposed to be infested, together with a record of the dates at which they had been seeded. In response to my request Mr. Jensen kindly forwarded to me two packages with the report that one was from a field that had been seeded between October 20 and November 1, and the other from one that had been seeded November 10-20. The letter which accompanied the samples contained the information that the last mentioned field was very badly infested, while on a 20 acre field that had been seeded October 4, the crop was in fine condition.

After examining the two samples I wrote Mr. Jensen as follows: "I have carefully examined the two packages of wheat you sent and I find, as I had supposed, that the principal trouble is not the Hessian Fly. In fact, in the first package you sent, (sown October 20 to November 1) careful examination revealed only four pupæ of this insect, which indicates that the infestation is not serious enough to cause the injury you mention, while in the second package no evidence whatever of Hessian Fly injury could be found. However, I find that nearly every stalk in this last sending is infested at the base, where it joins the roots, with a fungus disease, and this disease was also apparent on a considerable number of the stalks first sent. Whether this disease is entirely responsible for the injury you report or whether this may be due to unfavorable climatic and soil conditions I cannot certainly say. You will remember that two years ago there was an almost universally poor

crop of wheat throughout the valley, the injury being credited principally to the Hessian Fly. Investigation at that time indicated that it was principally due to unfavorable soil and climatic conditions, but last year I detected in several instances this same fungus which you send, and it is at least questionable whether it did not play a considerable role in the lessening of the wheat yield two years ago."

Both Mr. Robinet and Mr. Jordan reported that the disease appeared in spots of varying size throughout their fields. Mr. Jordan's wheat was growing on land that had produced but two crops previously. The first produced about 50 bushels per acre, the second was much injured by the wheat aphis and produced but 13 bushels per acre, while the present or third crop "is about half dead like the sample."

The disease is characterized by a blackening of the tissues of the lower part of the stem, particularly at the crown where the roots are given off and by the stunted, unthrifty appearance of the growing plants. Microscopic examination of sections of the diseased tissues showed an abundance of fungus mycelium ramifying through them but I have failed to detect any spores that would enable me to determine what fungus is doing the injury. No description of any such disease has been found in American literature of plant diseases. Whether the disease is a new one or not, and whether it is to become of economic importance, are subjects for further investigation. The above brief reference to the subject has been made only in the hope that farmers who have wheat that is evidently diseased will send me samples for examination.

A. B. Cordley, Entomologist.

DEPARTMENT OF BACTERIOLOGY.

In the fall of 1901 an experiment was begun in making vinegar from waste prunes and other fruits. The prune vinegar was carried on a scale sufficiently large to determine its practicability.

There were 174½ boxes of prunes used which yielded 630 gallons of juice. The prunes were crushed and fermented with pure cultures of yeast in a large tank which allowed the clear liquid to drain out as it was liberated. It was received in barrels where it remained undisturbed until fermentation had ceased. An analysis at that time showed 10 per cent alcohol.

Pure cultures of bacilli pasteuriannum were then floated upon the surface by means of thin cork and the process of vinegar-making allowed to go on. At the present writing the barrel containing the highest amount of acetic acid tests 3 per cent. It will be allowed to continue to form acid until the maximum strength is reached.

A five gallon keg of pear juice treated the same as the prune juice yielded a vinegar of 9 per cent acetic acid.

The other fruit juices were experimented with in one half gallon jars, yielding the following per cent of acid:

1.	Ripened summer pears	3.52 per cent.
2.	Ripe Bartletts	1.72 " "
3.	Wind-fall petites	1.08 " "
4.	Unripe Baldwin apples	2.21 " "
5.	Orleans plums	1.54 " "
6.	Green Gage plums	1.30 " "
7.	Goldendrop plums	3.18 " "
8.	Italian prunes	6.23 " "

A bacterial investigation of the fermenting of corn silage required a great deal of time and labor. The most difficult feature was to follow the rapid transformations which took place. The weather was warm at the time of filling the silo and the organisms causing the various fermentations were almost spontaneous. Bacillus subtilis was the most active germ present, and by far the most numerous at first. Saccharomyces ellipsoideus was next in number but diminished as the temperature became higher in the silo. Then appeared bacillus pasteurianum and bacillis aceti multiplying very rapidly as fermentation ceased, especially near the surface of the silage. The deeper in the silo the sample was taken the more they diminished in numbers. There were also other organisms present in minor quantities, apparently having but little to do with the fermentation.

Three silos were used in the investigation. They were12 ft. high and 5 ft. in diameter, tongued and grooved and with bottoms in them. Number 1 was used as a check. To number 2 was added, while being filled, 1 per cent of common salt. Number 3 was filled and a 1 per cent solution of salt was added with a view of submerging the silage in the weak salt solution to prevent the formation of acid. Unfortunately a leak occurred which frustrated the experiment.

The temperature was taken each day about one foot from the top and also in the center of the silo, by means of a pipe which had been inserted reaching the center from the side in which the thermometer was placed. In silo No. 1 the temperature at the top rose in eight days from 80°F. to 120°, then in 30 days lowered to 80°

again. In the center it rose in 13 days from 65° to 76°F., then dropped in 30 days to 64°F. In silo No. 2 the temperature at the top rose from 80° to 130°F. in five days, then dropped to 80° again in 30 days. In the center it rose from 65° to 80°F. in seven days then dropped to 62° in thirty days. In silo No. 3 the temperature at the top rose from 80° to 120°F. in five days, dropping to 72° in 30 days. In the center it rose from 60°F. to 66° in five days and it varied from that to 62° in thirty days.

The silage from No. 2 was excellent—it was firm, crisp, green and did not contain an excess of acid.

An experiment has just been completed to determine whether or not germs from foul water pass through the cow into the milk. The results are set forth in bulletin number 71. The experiment required an immense amount of laboratory work of the most exacting nature.

Diseases of stock diagnosed from specimens sent to the laboratory were:

Anthrax bovine	2 cases
Anthrax equine	3 "
Glanders	3 "
Actinomyces	2 "
Swine plague	2 "
Swine pneumonia	2 "
Contagious pustular dermatitis (in sheep)	2 "
Strongylus ovis pulmonalis (in sheep)	1 "

Other cattle, sheep and calf troubles, 17 cases; chicken diseases, tuberculosis 7, throat and lung 7, asphyxia 2 cases.

An investigation of the effect of lime and sulphur dip on wool was conducted on a small scale. Sheep were dipped with dips of various strengths and under different conditions. A microscope study of the fibre before and after dipping showed a detrimental action on the wool, especially when a dip had been used that had not been cleared of sediment. The fibre was found to be burned in spots where particles of sediment adhered to it; the strength and elasticity of the fibre were seriously impaired.

E. F. Pernot, Bacteriologist.

DEPARTMENTS OF HORTICULTURE AND GARDENING

During the year just ended I have endeavored at all times to keep the orchard in as good condition as possible with the material at hand for so doing. In the fall all varieties were taken care of and record kept during the winter months as to their keeping qualities

and market value. In the early spring of this year several unworthy varieties of apples have been top-grafted with other known valuable varieties, such as Blenheim orange—Russian apple (Kooroochang) and Giles' crab—also a few pears and grapes.

The plot of ground that has been used for market gardening has been planted with young apple and cherry trees, in number, one hundred and sixteen. The whole orchard has been pruned. The small fruits also have had their share of attention.

Strawberries.—During the fall a few rows of young plants were set out of such varieties as Prof. E. R. Lake thought worthy. These have been taken care of as far as possible this spring.

Blackberries.—These have been pruned and trained on trellis, that is, those of the weaker growing varieties. Those of the strong and more upright growth have been properly pruned and staked.

Raspberries.—Raspberries have also been cared for in the same manner as the blackberries.

Grape.—All varieties have been well pruned and properly cultivated. Some varieties have been saved for stocks for other varieties which I hope will do well.

Apple-Room. The room set apart in the fruit drying building has been furnished with five benches on either side, one above the other, about two feet apart, making room for storing about one hundred bushels.

Planting Seed.—In the spring varieties of plum and cherries were sown for the purpose of raising hardy stock for grafting other varieties onto, also for the use in class work.

Vegetable Gardening.—During the spring and summer of 1901 there were eighty-five varieties of vegetables planted in the garden for testing. Quite a number proved valueless while others were quite a success. The varieties sown are as follows:

Celery.—Buell Lamberson—Golden self-blanching. This variety gave good satisfaction and was grown in two different ways. Two rows were sub-irrigated and two rows surface-irrigated. The sub-irrigating did not prove beneficial only at one end of the rows. The reasons for this are two-fold; first, the ground being a little lower at one end the water naturally soaked to the lowest end, giving, therefore, a much better growth. On the upper end the soil is well penetrated with roots from a huge maple which consequently took a great deal of moisture from the celery plants. Plants that were surfaced did not show so much difference in growth although they

showed signs of being weakened by the roots of the tree. But altogether the surface irrigation was a greater success. The Self-blanching is a much earlier variety than the Golden self-blanching. But neither of them is of any value as a late crop as both are very much affected by cold rain and light frost. The late Giant Red is a variety that stands well into the spring, but even this latter variety will not endure very hard frost after the ground becomes well saturated with water. All varieties ought to be taken up and stored away in some dry, cool place and there blanched, which it will do if well packed and kept moderately moist at the roots.

Cabbage.—Burpee's Savoy—Improved Drumhead. This proved to be very valuable both as to hardiness and table use, being an excellent growing variety, standing cold frosty weather well, which improves its value for table use, having the effect of causing it to become much more tender and sweeter. It, therefore, can be recommended for winter use as it is in season from the latter part of November until March.

Burpee's Savoy—New Dwarf, or, in other words, the old dwarf ulm savoy. This is a small growing variety, consequently is somewhat earlier than the above, with much of the same makeup but will not stand so long in season.

Burpee's New Early—a very small growing variety, coming to use very quickly. Valuable as an early sort.

New Late—produced fine shaped and solid heads of a good quality.

Daniel's Late Queen—This is a very late cabbage, not producing a hard solid head but is of excellent flavor, being much sweeter to the taste than any other variety.

Daniel's Defiance—A very small, compact growing variety. The test was not satisfactory owing to unavoidable damage to the plants.

King's Reading Defiance—An extra late growing variety not producing many good heads. Those that did mature before going to seed were fairly good.

Savoy No. 13—A small growing variety, early, solid; good variety.

Brussel Sprouts.—"King Excelsior"—These produced an excellent crop of well formed and solid sprouts during the winter months. Very valuable as a winter vegetable plant, standing the climate well. Plants of these have been saved for reproducing seed.

Brocoli.—Lemington King—An excellent variety for this climate as the plant is so constructed as to protect the heart of the plant from frost and rain. Every head is enveloped in a complete system

of leaves folded over each other so that the head of brocoli is of a good size before showing itself, thus being well protected. It comes into use the last of March and through April. The heads are of good color and solid and of large size.

Monarch King—A very dwarf growing variety and the latest variety of any good solid heads.

Beans.—Willow Leaf Lima (Burpee)—A variety that does fairly well here. Plant dwarf growing and produces well.

Broad, or Green—Two varieties were grown, namely, No. 4352 and 4353. The first named variety is a dwarf growing one, producing short thick pods resembling the early Marzagan, and the latter resembling that of Seville Long Pod. Both are good growing and producing varieties and are sought after by some as a good vegetable when young only, as they have a strong taste when old.

Extra Early Refergee, O. A. C.—An excellent variety, being a long time in use as a green bean. A valuable variety.

Union Bean—Department of Agriculture—No. 4966. This variety made a good growth, producing good pods, and proved to be of some value for table use. The few seeds we received from the Department at Washington produced so well that I concluded to save all the seed I could get. Those saved in 1900 were sown in the spring of 1901. This year we have a goodly supply and have sown again so that next season this variety may be distributed to the farmers.

Buff Bean.—This variety was received from the same source as the foregoing and will be treated in the same manner.

New Stringless (Burpee).—A variety destined to become a standard owing to the length of time it remains fit for use.

New Dwarf Wax (Burpee).—Variety of quick growing but did not yield so well as some others. Not thought to be worthy.

Bush Lima, Quarter Century Strain (Burpee).—Made good growth but failed to mature well. Only a few seeds saved but what we have will be given another trial this season.

Cauliflower.—Dry Weather (Burpee)—A variety of great value for this climate as the name suggests. It really does stand our dry season well. This is the third year of testing and it has proved itself worthy above all others. It has the freak of starting into new growth from the collar of the plant after the head has been cut. This produces a second crop during the end of August and early part of September.

Cucumber.—Fordhook Pickling (Burpee)—Did not succeed.

Long Green—Same as the foregoing.

Corn.—Early Sheffield Sweet (Burpee)—An early variety, maturing early. Ears small and poorly filled.

Cosmopolitan (Burpee).—Dwarf growing variety. Prolific. Ears large and well filled. A few days later than the former.

Dreadnaught.—Early Adams (Burpee)—Ears long and slender. Plant, tall. Five days later than the others.

Tomatoes.—Eight varieties have been tested. Of these all were supposed to be newly introduced by different seedsmen. But for some unaccoutable reason there was only one variety that matured, namely, Fordhook First. The latter is a small, smooth variety, of good quality; color, light red.

Onions.—Ten varieties of onion were sown in boxes during the spring of 1901. Four failed to germinate. Each variety was put into open ground April 19, 1901. All did exceedingly well both in size and maturity, keeping into the month of April, 1902.

Peas.—Gregory's Surprise (Burpee)—Sown on April 18th, bloomed June 4th, edible maturity the 20th, marketable maturityt he 26th, matured the 30th. A good quality pea, of dwarf habit.

New English Forcing.—A very dwarf growing variety. A great producer. Sown on April 17th, germinated May 1, bloomed June 6th, edible maturity 24th, marketable maturity 29th, matured the 30th. Height of plant, 12 inches.

Hurst Reliance (Burpee).—This is a later variety. Of good growth, that is, can be grown without staking. Sown April 17th, germinated May 18th, bloomed June 22d, edible maturity July 4th, marketable maturity July 10th, maturing July 30th.

American Wonder.—An old, well tried variety. One of the best.

Champion of England.—Another well tried variety. Excellent for late or main crop. The standard variety, being a good producer and of excellent quality.

Parsnips.—Of these, two varieties were grown, namely, King's Perfection Marrow and Sutton's Tender and True. Evidently these must have been of extra good taste as the gophers ate every one up before they came to maturity. Not one left to tell the tale.

Hops.—During the month of March, 1901, the following varities of hops were planted 5758, 5760, 5768, 5787, 5836, 5587, 5593, 5801, Moravian, Duber Green, and one variety Prof. Lake brought from Germany. Out of the above seven hundred and fifty-six planted

three hundred and nineteen died due to their having been too long exposed in traveling. As far as possible these have been renewed with cuttings that had survived. The yard has been properly worked during the spring and plants poled and kept in a state of good cultivation. During the month of March all the hop plants were attended to; all suckers removed. This was done for the purpose of throwing the strength into the young shoots that were left on the plants. In the second week of April posts were set and wire stretched and strings placed to each hopvine. Also, the ground was put in good cultivation.

On April 19th the work of plowing the orchard was commenced.

Peas and Broad beans were sown the early part of the month. During the last two weeks of April seedling plums, quince and apple were planted. These are to be used for stock for grafting the coming year.

There has been planted into boxes new varieties of cabbage plants from seed sent by Attlee Burpee for testing the coming season.

During the latter part of the month of April a number of seedling apples and quince were set out, the latter variety being in poor condition, I doubt very much if they will pull through. The cause of the condition is that they had been packed too long in boxes before planting.

Two varieties of new cabbage were set out for testing, also two of corn, three of beans, four of peas, one of mangle, one of cauliflower, one of some new Japanese vetch, gourd seed from the Imperial Palace of China, three varieties of lettuce, one variety of onion seed which was received from Col. R. C. Judson for testing.

The work of cultivation of the above has been done through the month of June.

GEORGE COOTE,
Florist and Acting Horticulturist.

REPORTS OF STANDING COMMITTEES.

REPORT OF THE EXECUTIVE COMMITTEE.

Corvallis, Oregon, July 16, 1902.

To the Board of Regents of the State Agricultural College:

We your executive committee beg leave to report proceedings for the year past as follows:

We organized by electing J. K. Weatherford chairman and J. D.

Daly secretary. The membership of the committee was not changed from that of last year. All our work after organization was in the interest of the experiment station at Union.

We have held two meetings at Union during the year, and Dr. Withycombe, director of the station, attended both. The condition of the station, briefly stated, is as follows:

The work of last year on the farm was destroyed by flood and your committee decided to ditch the land so as to prevent a recurrence of such a disaster. This has been done successfully at a very slight cost. Prof. Leckenby is in charge of the station and such help as is needed is hired from time to time from local sources.

We have purchased horses and implements and tools for the working of the farm, and the work laid out by your committee is the cultivation and experimental work on grasses and forage plants and sugar beets. There are now some 40 different kinds of grasses and a variety of sugar beets and the farm and work is in excellent condition. Having more land than was necessary for experimental purposes, we leased 200 acres of the farm at an annual rental of $3.00 per acre. This will in no way interfere with the experimental work on the farm.

At our last meeting, held June 13th, it was decided to experiment in the feeding of stock in addition to other experimental work now going on, and to that end it was agreed to ask the state to appropriate $20,000 at the next meeting of the legislature to be used for the purchase of stock, building barns, establishing a laboratory, getting a water supply, fencing and completing the drainage system now under way and for current expenses for the ensuing two years. Of the $10,000 appropriated for the purpose of establishing an experiment station at Union, we have spent $7,516 and have on hand $2,480 with which to pay the current expenses of the farm until the legislature provides for its future, which will be probably nine months. As the current expenses range from $200 to $300 per month this will suffice but nothing can be spent for improvement or appliances until another appropriotion is made by the state.

For the money spent we have a two storied brick building, a span of good horses, a new wagon, ploughs, cultivators, mowers and other farm implements; repaired and painted and papered the dwelling, repaired the barn and various other improvements as well as a complete drainage system of ditches that will prevent flooding in the future.

A dispute between Mr. Leckenby, the man in charge, and the Hutchison brothers as to water ditch rights threatened a severe law suit and at one time the arrest of Mr. Leckenby, who three times broke a ditch that had been established 30 years but which was flooding part of the farm. This confronted your committee at our last meeting in June and was happily settled by Mr. Weatherford, chairman of the committee, to the satisfaction of the parties concerned without sacrificing any of our legal rights or privileges.

The execution of the work on the farm has been entrusted by us to a committee consisting of three members of which Capt. J. T. Apperson was chairman and credit is due them for the faithful performance of duty. Mr. J. M. Church, as the local regent, has had a large share of the detail work to do, and has supervised carefully the local expenditures.

J. K. Weatherford, Chairman.
J. T. Apperson,
J. D. Daly,
Executive Committee.

REPORT OF THE COLLEGE COMMITTEE.

To the Board of Regents of the Oregon Agricultural College, Greeting:

We, your committee on College, respectfully submit the following report:

We believe the year just closed to have been, from the standpoint of efficient work, the most comprehensive and successful in the history of the Agricultural College. The work in the various departments, has kept pace with the growth of the student body. and in every line the methods and measures for imparting instruction have been strengthened. It is our view that this board and its faculty has well in mind the true purpose and idea of institutions of this character, and that as steadily and speedily as possible the college is being brought to that ideal that was steadfast in the conception of the late Justin Morrill, father and founder of the agricultural colleges of the country.

In furtherance of the movement thus referred to, we submit for your consideration, the following recommendations:

1st.—In some of the departments there is more work than the force of instructors available can conveniently and satisfactorily perform. In other departments, but a portion of the time of some of the instructors is occupied during what might be reasonably

claimed as class hours. Lack of funds renders employment of additional instructors in over-burdened departments impossible, and the leisure that is observable in other departments suggests it to be unnecessary. The salaries paid instructors are sufficient to justify this board in claiming their services in one department or another at least eight periods per day out of the five days in each week, especially considering that at least two and one-half months out of the year they have for rest and recreation. We therefore recommend that this board authoritatively declare that the instructors in any one department who may have leisure or vacant periods of right ought to render assistance to departments more occupied, and that they are expected by this board to render such assistance to the extent of occupying their own time to the extent of eight periods per day, if necessary, to promote the welfare of other departments.

2d.—It is our view that promotion of the facilities for work in the household science department of this institution, is a necessary step for the furtherance of education that will prepare young women for the work of lifting up and rendering more attractive the homes of this state. The present facilities in the department of household economy are far short of the actual requirements. They are far inferior to the facilities in private schools of the same character within the state. In order to remedy the defect and to prepare for providing ample facilities for this department we commend that this board declare its purpose to develop and strengthen the department of Household Economy by providing for as soon as means will permit ample facilities for said department; and we further recommend that there be delegated to some proper committee the duty of making investigation as to what equipment may be needed in the said department, the cost of same, said committee's findings to be embodied fully in a report to be submitted to this board at its meeting next January.

Respectfully submitted,

B. F. Irvine,
W. P. Keady,
College Committee.

REPORT OF THE STATION COMMITTEE.

Corvallis, Oregon, July 16, 1902

To the Board of Regents of the Oregon Agricultural College:

Your committee on the Agricultural Experiment Station submits this, its annual report.

The station has had an active, prosperous and useful year. The station staff is now active, ambitious and intelligent, and is working harmoniously except as hereinafter mentioned.

As to laboratories—the station equipment is ample and of the most modern.

There have been valuable additions to the dairy and Short Horn herds during the year; our dairy herd is a representative Jersey herd and has some of the most valuable strains of that blood; our Short Horns are as good as there are anywhere. Our already excellent flock of Cotswold and Shropshire sheep have been augmented by a satisfactory natural increase during the year, and Mr. J. B. Stump, of Monmouth, has presented us with a grand Cotswold ram by which our flock is now headed.

The sheep, dairy and cattle interests of the state are making fine progress and the station staff is in close and confidential touch with these interests.

Hogs.—The station has determined and ascertained during the year that hogs can be well and economically grown to the fattening stage without grain or other food than green vetches, and we shall be able to winter breeding hogs on vetch silage.

During the year the station has ascertained that an abundant supply of vinegar can be manufactured from refuse prunes.

Our bacteriologist, after careful and intelligent experiments and investigations, has found that no bacterial contaminations are contained in milk as it comes from the cow. We have no doubt of the correctness of this conclusion as in the great scheme of nature, milk is intended to nourish young mammals and not to poison or destroy them.

The station has ascertained during the year that this state can develop a valuable industry in the production of rape seed. Being a biennial, the rape plant must winter before it seeds, and in most localities where rape is used for pasture the winters are so severe that the plant is destroyed by cold before reaching its second or seeding year.

SWEET SILAGE.—During the year the station has produced sweet silage from clover, vetches and corn. The process is the same as has heretofore been in use up to the point where the silo is filled. Then we insert from the boiler a steam pipe at the base of the silo and inject steam until the germs of ferment are destroyed, then close the silo. This silage is canned and remains sweet indefinitely thus furnishing green, sweet food during the dry season and all winter.

BENTON KILLIN,
JOHN D. OLWELL,
Station Committee.

REPORT OF THE BUILDING AND IMPROVEMENT COMMITTEE.

Corvallis, Oregon, July 16, 1902.

To the Board of Regents of the State Agricultural College of Oregon:

We your building and improvement committee beg leave to report as follows:

Since our last report in January, when we had let the contract for the new building and had not selected a site for it, and the matter of selecting a site having been referred back to us by you, the following work has been done:

The plans for the new building were left at the college office for the inspection of the faculty for two weeks and suggestions and alterations made as was thought necessary.

Your committee after securing the presence of the architect and contractor, and after full discussion with the president of the college and the director of the station, carefully considered the grounds at our disposal in all their bearings, took measurements, and finally located the new agricultural hall on the college campus, east of the armory and south of the main college building.

The committee met on the 15th of April for the purpose of considering the plans and advertising bids to heat the new building and ordered the architect to prepare plans and advertise for bids, which was done and on May 2d we met again to open the bids, when the specifications and bid of George W. Kendall were accepted and the contract awarded to him for $3,925.00.

The contract for the new building is - - -		$38,300.00
For heating it - - - - - - - - -		3,925.00
Probable architect's fees - - - - - - -		2,200.00
Of this we had of the old $20,000 approximately $11,982.		$44,425.00
We have this year - - - - - -	25,000.	36,983.00
Which will leave over on next year - - -		$ 7,442.00

This has been provided for with the contractors so that their money is not due until after January 10th of next year.

So far we have had few extras, practically none, but as it is possible there may be, then these figures will be increased by that much.

The new building has interfered very materially with the drill and athletic grounds, and your committee have consented to the leasing of the Hogg land adjoining the campus for athletic games; the athletic society, so far, have borne the expense, but some permanent arrangement must be made for this purpose for two reasons —first, to provide a proper drill and athletic ground and second, to allow of the permanent improvement and beautifying of college grounds.

J. T. Apperson.

Jno. D. Daly, Sec'y.

J. K. Weatherford.